NATURE MAGAZINE

NOVEMBER 1931 35¢ VOL. 18, NO. 5

1931 CHRISTMAS GREETINGS

A BOX ASSORTMENT

of Twenty-one Cards *and* Folders

"MERRY Christmas"—How are you going to say it to your friends this year?

We are now able to offer for the coming Yuletide season an *unusually* attractive box assortment of twenty-one Christmas Cards and Folders of new and original design and bearing a wide range of Christmas sentiments—and all for

$1.00 per box, postpaid!

The modern and the old-fashioned, the sedate and the brilliant make up the wide variety of designs. Different types of greetings ranging from the strictly formal to expressive little verses insure your finding a card to please each one of your friends. The quality and dignity in these Christmas Cards make the assortment distinctive and of unusual value.

The cards are packed in a striking, unique box, on which no printing appears—thus it will make an ideal container in which to pack one of your Christmas gifts.

WHILE THE CARDS ARE NOT ALL-NATURE IN SUBJECT MATTER, they are so interesting in color, design and sentiment that we know our subscribers will be well pleased, as will their friends on Christmas day.

The illustration shows a few of the designs. You will be agreeably surprised with the VALUE and QUALITY of this assortment of twenty-one designs.

MAIL ***coupon* NOW *for your box and avoid the Christmas rush!***

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for.....Boxes of 1931 Christmas Greetings.
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THE present great reduction from the standard price of the Britannica, announced last month, is attracting unusual interest throughout the country.

We expected, of course, that many who have always wanted the Britannica would take this opportunity of securing it at a great saving. The response, however, to our announcement exceeds even our own expectations.

And it is more than ever clear to us that keen, progressive and prudent people will not neglect this present compelling offer to save money and own the Britannica.

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The exceedingly low price is possible because we have adventurously faced a temporary condition in the printing, binding and labor fields. It is only because we ordered a printing equal to the largest single printing of the Britannica ever made that considerable savings were realized in the production costs—savings now passed on to you.

At the time of going to press, orders were coming in thick and fast. In a comparatively short time, the printing, we believe, will be entirely sold out. Don't delay, therefore, if you wish to profit by the present low price. We frankly don't know whether business conditions will ever make such a bold reduction possible again.

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We receive thousands of letters from heads of families who point with satisfaction to the day the Britannica came into their homes! These wonderful books never fail to help men, women and children when information, or indeed entertainment, is immediately needed. *And today is always the best time to buy them.*

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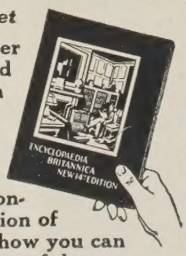

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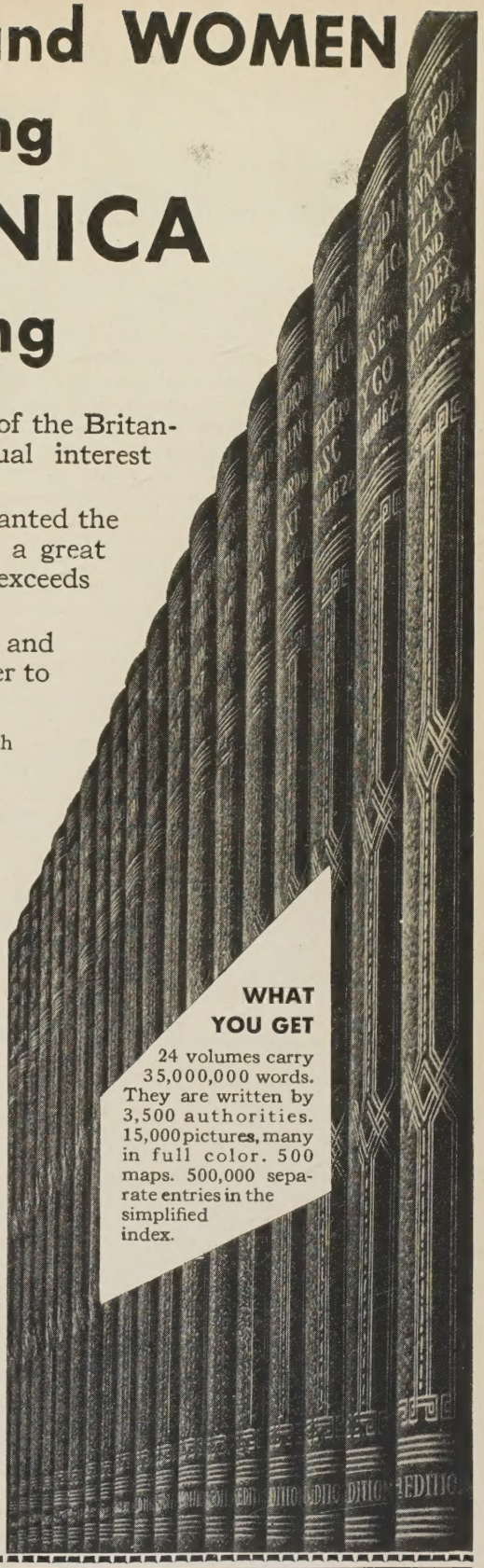

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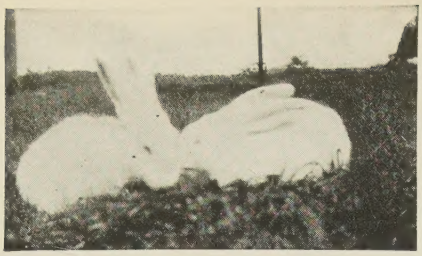


No. 1 For Constructive Criticism

Constructive Criticism

MANY readers of this page have signified their interest in a feature which was suggested some time ago: Giving constructive criticism of a certain type of picture each month. This we will endeavor to do in an effort to aid the beginner.

In the matter of composition there can, of course, be much controversy aside from a consideration of definite fundamentals on which artists and critics agree. We will confine ourselves, however, to the simplest terms and to the reference to faults that we have seen *most* in examining hundreds of pictures made by amateurs. Effects secured by incorrect operation of the camera itself will be included occasionally.

This month we will give "good measure" and discuss two pictures.

In No. 1, the rabbits are blurred. The author of this picture probably used a box type camera, the lens of which cannot be adjusted or focused for objects at various distances. On such cameras, the lens is set so that objects closer than about ten feet will not appear sharp, but objects at that distance and beyond will be reasonably sharp and well enough defined to make a generally good picture. In order to make satisfactory pictures closer than, say 8 or 10 feet, it would be necessary to secure a supplementary lens known as a portrait attachment. This, when slipped over the regular lens, permits of working at a distance of 3½ feet with the box type camera and at that distance will give a critically sharp image.

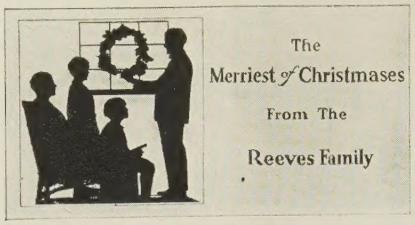
You will note upon close observation that the wire in the fence some distance back is quite sharp. The camera was evidently held quite low as the grass in the immediate foreground indicates. It is, however, considerably blurred, as are the rabbits, from being out of focus.

While it does not matter particularly in this instance, we can also point out that the camera was not held straight. Note that the corner of the house which just shows at the left of the picture is not straight nor is the iron pole which supports the wire fence. This would be an interesting little study of the rabbits had a portrait attachment lens been used.

Picture No. 2 appears to have been made with a focusing camera, and the user evidently set the pointer at the right mark

No. 2 For Constructive Criticism

EDITED BY ROBERT LOWELL



Silhouettes Always Appeal

Photographic Greeting Cards

LAST year at this time we printed a short article suggesting how truly personal greeting cards could be created by the aid of the camera. Considerable interest was aroused and there were many requests for the literature we offered which goes into detail about making photographic greeting cards.

If you have never attempted anything of the kind, you will find the work fascinating and will be naturally prideful of your achievement. Your friends who receive a card that cannot be bought will doubtless be enthusiastic, too.

Suitable camera studies for the greeting card include a view of the house or its doorway, possibly with a Christmas wreath in evidence—a picture of the fireplace or of some particularly cozy nook or corner, a snapshot of the youngster, or snaps of all members of the family—perhaps in silhouette. Possibly you have negatives of the right subjects on hand, but if not, there is plenty of time to make them. New pictures are, of course, best.

Should you not wish to make the completed card, hand the negative to be used to a good photo finisher, and give him an idea as to what is wanted.

If you want to do the work yourself and have not previously received the detailed instructions, write to the editor of this department.

Constructive Criticism—Continued

on the distance scale so that his group of subjects appears quite sharp.

However, very nearly *half* the picture is taken up by superfluous foreground, whereas we are sure the photographer would have been better pleased to have obtained larger images in his group. This picture was probably made at a distance of 25 feet, whereas if the camera had been snapped either 10 or 12 feet away, a better picture would have resulted.

We note that the subjects are in the shade. Some years ago it would not have been possible, with an ordinary camera, to secure a good snapshot exposure under such conditions, but film is now faster and snapshots can be made in the shade with certain brands that have recently been put on the market. We refer to Plenachrome and Verichrome films.

"Trick" Picture of a Beetle

The "Rhino" Beetle
—How the Picture Was Made—

AN ENTHUSIASTIC letter was received from a Mr. J. J. Sprague of Sarcoxie, Missouri, in which he enclosed this unusual "trick" picture. The photograph is doubly interesting because of the presumably rare bug which it shows. Let us quote from Mr. Sprague's letter in which he tells how the picture was made:

"I am a subscriber to your most excellent magazine, and have been a small town photographer for thirty years, and I am 72 years *young*.

"Just play around catching butterflies and bugs occasionally and find many amusing things outside business hours here in the Ozarks of S. W. Missouri.

"Last week a man in town brought in a bug I never saw before or in any text book on bugs, so I photographed it just for fun in a 'trick' picture which I enclose herewith.

"Maybe some of your subscribers would like to know how to make such pictures, so I will say that I first mount the bug on the end of a stick about 12 inches in front of a black background and carefully shield the background from any light, but have plenty on the bug. Then I expose the bug on two separate negatives, develop one of them, leaving the other undeveloped. After drying, I place the *undeveloped* negative in front of my ground glass in my View Camera and take the two men with me into the woods and carefully focus them where I want them, relative to the bug on my ground glass. Then close the camera shutter and place the undeveloped film in camera and 'shoot' the scene with the men posed as shown. Then I develop the 'scene' and, after dry, do a little retouching for the rope, etc., and it is ready for printing.

"It is easier to take these trick pictures out in the open on a hill with only sky or distant fields for background as this almost entirely eliminates retouching.

"This photo of the bug itself is only enlarged a little; the bug was about 1¼ inches long; he had no eyes on the side but two small eyes *under* his jaws. Can you name it?"

Newsy Notes
Literature on Request

THE new, compact and lightest weight roll film camera ever made is claimed for the new Avus outfit with fast lens and self-timing shutter. The price seems most reasonable.

Drem exposure meters, for both "still" and motion picture cameras, prevent film wastage. Easy to use.

You've heard about the Photoflash Lamp that permits taking pictures indoors or out, at night or on dull days indoors. No flame, no smoke, no danger. We have a new supply of literature.

Details furnished about the new "chrome" films introduced last spring and now so popular—Verichrome and Plenachrome.

Edited By
ELEANOR WALKER

EGYPT

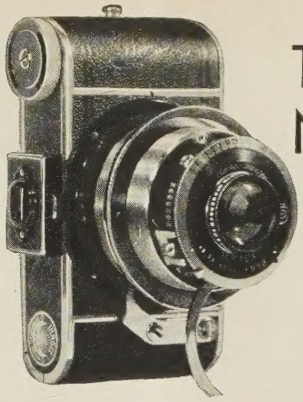
Egypt is a splendid example of how Nature can express herself without the aid of woods or meadows, without overpowering mountain peaks or a wide variety of contour. Color and scale are the two words which best interpret Egypt's beauty—the color of the landscape and the scale of its architecture.

The old saying "Egypt is the gift of the Nile" is literally true. The river cuts a groove through what would otherwise be totally desert, coating over a narrow strip of land on either side with alluvial soil brought from the Abyssinian Mountains. With the magic of its waters it brings the miracle of a profuse growth of corn, cotton, lentils, beans and sugar in an area which is totally surrounded by barrenness.

This oasis in the desert varies generally from five to ten miles in width, and is shut in by long ranges of low hills on either side almost endlessly monotonous in outline against the horizon. Usually they are not more than three hundred feet high, though sometimes, as near Thebes, they rise more boldly to 1,200 feet, and in the Abyssinian desert one or two peaks attain even 6,600 feet. Throughout the length of the valley these hills are naked and barren. Rarely one may see a palm grove, or even an occasional cluster of sycamores or acacia, of weeping willows, mulberry trees or tamarisk bushes. The contour as a rule, however, is sleek and shorn.

There are two seasons in Egypt. From June until the end of February the Nile is high, the wind is from the North, and the climate is perfect. From February to the end of June the river is low, there are mostly southerly winds and it gets very hot. The Nile reaches its height in September, the dams are gradually opened, and the water pours into the canals and sluices which irrigate the land. As soon as the water is absorbed a bit, the peasants plant the year's crops, most of which are reaped in March or April.

It is on the desert approaching the pyramids, such as those of Gizeh or Sakkara, that Egypt has a remarkable beauty. Stretching far away to the burning blue horizon is the yellow plain and the air is brilliant and clear. In the foreground may be palm groves and corn rows—and far away against the distant sky loom the pyramids, none exactly alike in shape or size or angle. Color is everywhere; the rust of rocks that edge the desert plain, the warm gold of the pyramids, the half-tones of shadows caught in the hollows of rock or sand-hills—blue, purple, green. Nature is usually lavish with her use of green, but in Egypt she seems to prefer the lovely reds and yellows of sand-hills against the brilliant blue of a low sky.



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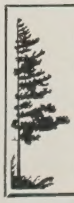

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Six unusual cards made of six different woods; flexible, fascinating, almost transparent. Delightful designs and greetings. Complete with envelopes, correspondence cards and an illustrated folder.

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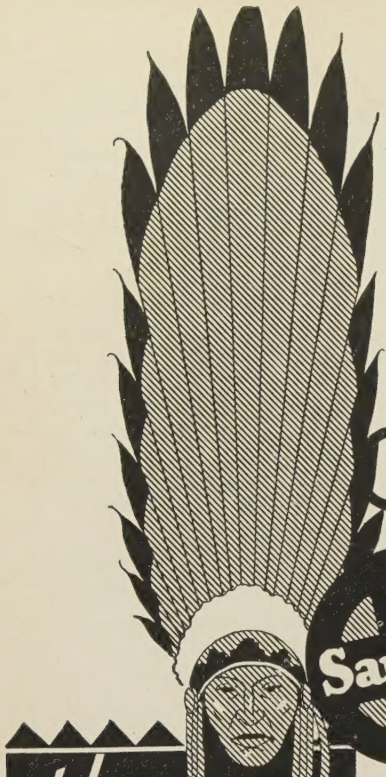

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Seen from a distance, the triangular forms of the pyramids seem more or less familiar, but as one gets nearer and nearer in the advance over the desert, they become inexpressively vast. The Pyramid of Khufu at Gizeh, for example, seems to shut out all one's sky and horizon. Its age is almost as overwhelming as its size, and one can hardly grasp the fact that this great grave of a Pharoah has cast its huge shadow over the plain for almost a mile for fifty or sixty centuries.

It seems strange that these ancient monarchs, the minute they began their reigns, no matter how young they might be, started to build their graves, and that all Egyptian art, as expressed in their pyramids, temples, and decoration of both, centers about the life of the dead.

The scale of their architecture is truly overwhelming. History tells us that this Great Pyramid originally contained 2,300,000 stones, each of two and one-half tons, that it would take 100,000 men nearly twenty years to complete it, and that it covers thirteen acres. Their temples, too, have the same vastness. In the hall at Karnak (and the hall is only one part of the temple) could be placed four Notre Dames of Paris,—and where is it—at the tombs of the sacred crocodiles at Serapeum. I believe that, in the empty Sarcophagi, four people could comfortably play a rubber of bridge.

The view from the top of the Great Pyramid is simply unique—vast stretches of uneven rolling desert to the west and south edged by the sunstruck Nile moving in a silver line into the misty distance. Eastward at the foot of the hills are the glittering domes of Cairo, with the tall, slim minarets of the citadel mosque, clear cut against the sky. And right alongside one feels hugely present the second pyramid, seemingly so close one could almost touch it. Centuries before the time of Christ these burial places were already ancient.

To see Egypt as she is today rather than thousands of years ago, one must take a trip on the Nile in a dahabeah, a sort of Egyptian house-boat, always gayly painted, perhaps sky-blue, perhaps lobster red, perhaps terra cotta, or even more beautifully white and green set off with a pink line. Life on deck is sheltered with many awnings, and a happier vantage point for seeing the sights couldn't be imagined. A "No-Trespassing" sign was never known along the Nile. There are no "thou shalt nots." Being an Egyptian, you use the Nile for everything. Here you drink your water, here you wash your clothes or your person, here you scrape and scour your camel, here you pluck your turkey and throw into the handy stream the feathers.

Boats of all kinds and ages abound—ferry boats shaped exactly like a Turkish slipper, market boats as full of animals as Noah's Ark, household boats bulging with ladies in gala array. And over all this miscellany, the sun casts an eastern light that makes everything from rags and dirt to the myriad colors reflected in the river brilliantly picturesque.

We hope too you may be in Egypt when the festivals of Islam turn Cairo into an Arabian Nights' Dream; that you may see something of the elegant society of Alexandria, and finish up perhaps studying the amphibious life of the delta country with its numberless birds and fish.

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For Suburban Gardeners

Just at a time when those commuting members of the weeder-and-hoe fraternity are getting the blisters off their hands, and settling peacefully down to a winter free from strenuous exercise, Louise Beebe Wilder decides to publish another book. And when Mrs. Wilder writes for gardeners, there is but one thing to do—to take advantage of her fertile ideas, sound suggestions and wealth of information before your neighbor outstrips you. *Adventures in a Suburban Garden* is a direct challenge to the horticultural spirit of the five-fifteeners. It is a narration of what Mrs. Wilder accomplished on an acre within thirty minutes of Grand Central Station, coupled with a fund of information about plants old and new, designs, rock-gardens, color arrangements, time elements and efficiency in the accomplishment of garden tasks. It contains no fine-blown theories evoked from an imaginative mind; every plan Mrs. Wilder offers has been tried in the fire of skepticism and has survived the sword-thrusts of extensive criticism. During these long fall evenings this volume will make an ideal companion with which to talk over the program for another year. The Macmillan Company prices it at $3.50.

Historie Of Plantes

That old Elizabethan botanist, Gerard, whose *Historie of Plantes,* first published in 1597, has drifted down through the centuries to amuse both plant lovers and bookworms, lives again in a new edition. Houghton Mifflin has brought out *Leaves from Gerard's Herball,* arranged by Marcus Woodward and featuring one hundred wood-cuts that match the antique type in which the book is printed. Gerard was not only a botanist of note; he was an essayist who wrote wittily and pithily. Some of his descriptions of common plants never have been excelled. True, he was hardly scientific—he swallowed wholesale the story of the barnacle trees that produced geese and tells as an eye witness of spume that hatched into "A fowle bigger than a Mallard, and lesser than a Goose". His "Table of Sundry Vertues", featuring "a good AMOROUS medicine to make one in love" and plants "to keep little DOGS from growing great" and to keep a man from being DRUNKE" suggests quackery, but he was only incorporating the learning of his time. The greater number of plants of which he writes are common in the United States today, and the more plant knowledge one has the better he will enjoy this book. It is priced at $3.00.

New Primitive Area

The Gore Range-Eagle Nest Primitive Area, containing about eighty thousand acres and some of the finest of Colorado scenery, has been established by the U. S. Forest Service. It includes both sides of the Gore Range within the Arapaho and Holy Cross National Forests. Traversed by a series of trails, and with good fishing streams, it is ideal for those desiring to "rough it". No roads are to be built, and no summer homes or resorts will be permitted. It will be left in its natural state for the benefit of those who wish to get away from signs of civilization.

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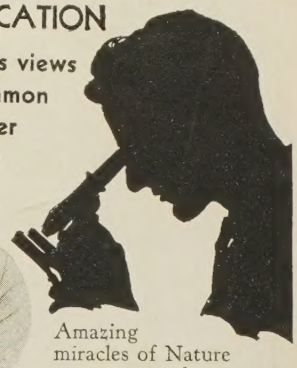

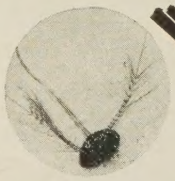

Head of a mosquito at low magnification.

Sea Algae as seen at 50 magnifications.

The fairy lace of a bird's wing feather.

Amazing miracles of Nature are everywhere — in a drop of stagnant water, a fly's eye, a mosquito's antennae, a feather, a blade of grass, a bit of your own skin. This remarkable microscope provides endless hours of pleasure and learning.

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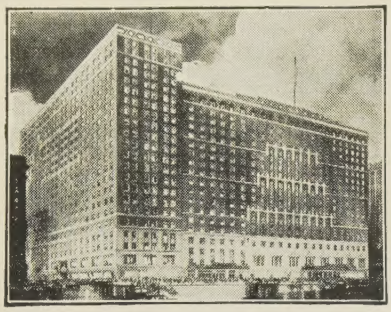

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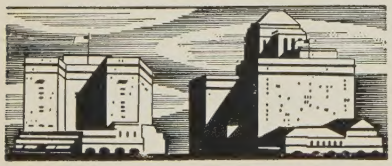

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Milton P. Skinner Lectures

Milton P. Skinner, first Park Naturalist appointed in the National Park service, and the first organizer of the naturalist work in the parks, is giving a series of Nature lectures in the public schools of southern California and before service clubs and scientific societies throughout the entire state this fall and winter. These are illustrated by his own slides and moving picture films and deal with various features of wild life, particularly in Yellowstone National Park. Another of Mr. Skinner's achievements was the establishment of the first of the popular Park *Nature Notes*, official publications of Nature events occurring within the parks. His address is 5840 John Avenue, Long Beach, California.

Audubon Year-Book

The alert Indiana Audubon Society has recently published its very attractive 1931 year-book, and bird-lovers have an opportunity to enjoy several interesting articles as well as to learn of the sterling conservation progress made in the Hoosier state last year. The officers of the Society are: Dr. Earl Brooks, president; O. B. Christy, first vice-president; Dr. L. A. Test, second vice-president; Mrs. J. E. Fredrick, third vice-president, and Miss Margaret R. Knox, secretary-treasurer. Information about the year-book may be obtained from Mr. Brooks at Noblesville, Indiana.

Gulls Fight Grasshoppers

During the recent grasshopper plague that visited the western states there were one group of insect-fighters that received no rewards, gained no plaudits and asked no favors. They were Franklin gulls, driven south from their bodies of water in Canada by the drouth, and they descended upon the grasshoppers in the grain fields between Minot, North Dakota and Cogswell like the wolf on the fold. Farmers said that vast savings had been rendered by the birds by the thorough way in which they cleaned out the pests.

Hawaii Nature Notes

The first issue of *Nature Notes* from Hawaii National Park was issued in June under the editorship of E. P. Leavitt, superintendent, and John E. Doerr, Jr., the park naturalist, and at once assumed a rank equal with the other park *Nature Notes* which have, for several years, presented in mimeographed form the interesting features of and events in their particular reserves.

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For Farmer and Botanist

Two interesting little books by the same author have come to our attention and, although they are in different fields, we will review them together. The author is A. S. Hitchcock, who is Principal Botanist in charge of Systematic Agrostology of the U. S. Department of Agriculture. In *Field Work for the Local Botanist,* Dr. Hitchcock presents material which should be of inestimable value to the amateur botanist as a guide to what he or she may do in the way of original study in many lines and right in one's local surroundings. We have never encountered a work such as this 58-page booklet, and now that we have we wonder why someone has not before come forward with such helpful and suggestive material. Dr. Hitchcock's other book is *A Manual of Farm Grasses* covering forage grasses and of special interest to the farmer, of course. The primary purpose of the book is to provide information aiding the identification of these grasses, and, secondarily, touching upon their culture. Both are available from the author at 1867 Park Road, Washington, D. C., the botany booklet selling for $1.10 and the grass book for $2.00. Both ordered together may be had for $2.10.

Penn, the Penguin

A much publicized bird of recent years, the penguin lends himself admirably to story and illustration, as well as intrigues the interest by his peculiarities. Thus *Penn, the Penguin* by Allen Chaffee should find a receptive audience of readers among our younger folk. Mr. Chaffee has written an amusing little story of the penguins of Adèlie Land, presenting it in fiction form but at the same time giving much information on the interesting life of these queer birds. The book is attractively illustrated by Henry Suskind and published by Jonathan Cape and Harrison Smith, 139 East 46th Street, New York.

Keeping Bees

Josephine Morse has been keeping bees for many years and has, at the same time, been writing about them, for the most part in publications devoted to this industry. Now she combines with her knowledge of bees the interesting experiences of her years with them and fashions the whole into a book entitled *Following the Bee Line.* Her style is entertaining and informal and the book is therefore both useful and good reading. It is published by Thomas S. Rockwell Co., 209 W. Jackson Boulevard, Chicago, and sells for $1.25.

Bear Returns Again

Old Scarface Grizzly, long king of the Yellowstone bears, who was thought to have abdicated in favor of a younger bruin early this year, is back at Old Faithful again, receiving the curtain calls of park visitors, despite rumors that he had departed this world. His reappearance was dramatic. The park naturalist had just finished his bear talk, and had commented at length on the missing animal, when the subject of the lecture strolled nonchalantly into view, according to Mrs. J. T. Schain of Los Angeles, California, who was present at the time. Long live the king!

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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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TREES FOR WASHINGTON

An Editorial

TWO HUNDRED years ago, come next February, a child was born to a family of Virginia aristocrats who was destined to lead a rebellious people through many sombre crises, to aid them in the formation of a republican form of government and to preside over that new-born democracy in its first faltering years. Next year the people of the United States will do honor in various ways to the memory of George Washington.

Naturally the observances which will be held will take many forms. That there may be some coordination of effort, and that helpful suggestions and programs may be made available, the George Washington Bicentennial Commission was authorized and endowed by Congress. It seems to us, however, that one of the most appropriate activities in honor of Washington is that delegated by the Commission to the American Tree Association.

For some nine years this Association has carried on a national campaign of education as to the importance of trees, individually and collectively. It has sought to plant in the minds of Americans that as they use forests they must plant them; that protection of forest resources against careless fires is a national responsibility; that he who plants one tree or many trees has done a constructive and creative act. All this has been done through the vision and under the leadership of Charles Lathrop Pack, President of the American Tree Association, whose steadfast purpose in behalf of our forests has never faltered.

So to the American Tree Association has been given the task of bringing about the planting of ten million trees, each and every one dedicated to the memory of George Washington. To this end the organization has enlisted the cooperation of individuals, women's clubs, civic groups, organizations of young people and societies of many kinds. It has published a tree-planting book adapted to this particular campaign and distributes it free to all who ask for it. It presents—likewise free—to all who plant, a certificate of membership in the growing army of George Washington tree planters.

And the most surprising thing is that already, even before the bicentennial year has come, nearly eight million trees have been registered and will be dedicated next year to our first President. Obviously the ten million mark will be reached and passed. Perhaps twenty million young trees will reach their roots into the ground and their limbs toward the skies in honor of Washington. Many acres of idle lands will be transformed into growing forests through the stimulus of his leadership in the dark days of revolution—a leadership of that enduring quality inherent in greatness. Thousands of individual trees, including one planted on the White House grounds by the President of today, will stand as a symbol of the great general and statesman.

One hundred years hence, when the tercentenary of the birth of Washington is observed, these trees will have grown to large size with ample shade. Perhaps some of the forest trees will have been cut to supply the needs of our people and new trees will be growing in their places. There is a special appropriateness in such a memorial that lives and grows, particularly when it is dedicated to an achievement that also still lives and grows.

George Washington believed in the building of a national government and a nation as nearly sufficient unto itself as possible. This meant the creation of resources sufficient for emergency. It meant the conservation of resources, and one of the most vital of these is our forests.

While the planting of ten or even twenty million trees, many of which will be in groves and individual plantings, may not materially add to our forest reserve, they will accomplish one thing. These plantings will focus the attention of our people on the need of reforestation. Thus in this program of commemoration is to be found an educational movement of immense value; an activity which certainly Washington would heartily approve.

So let us grasp this opportunity; let us treble, if we can, the original goal of ten million Washington trees. Let us render, through this means, honor to this man whose gift to the progress of the freedom of man and to the erection of a democracy cannot be dimmed by the passage of time.

THE LANDING OF THE ROCKET SHIP ON THE PLANET MARS, AND THE GREETING OF THE MARTIANS AS CONCEIVED BY JEX. THE POSSIBILITY OF LIFE ON THE RED PLANET IS AT LEAST A FASCINATING THOUGHT

NATURE MAGAZINE
VOLUME 18 NOVEMBER · 1931 NUMBER 5

BY ROCKET TO THE PLANETS

BY DAVID A. LASSER
PRESIDENT, AMERICAN INTERPLANETARY SOCIETY

TO THE imaginative mind, viewing the star-filled heavens and the luminous glow of the planets, there is present continually a world of mystery, and the suggestion of tremendous adventure beyond our earth. Since the day man recognized the planets as worlds like our earth, two questions have filled his mind: how can I get there and what will I find?

In myth, in story, in scientific speculation, literature from the time of the Greeks has been filled with commentaries on the nature of our sister planets and of the great interplanetary space. Investigators searched out with telescopes the mysteries of the heavens, building up laboriously the impressive science of astronomy. By their side were men of letters, with unleashed imaginations, peopling the heavens and the planets with the creatures of their fancies.

In all this investigation and romancing, it was not questioned that some day the planetary mysteries would be solved. Man would travel to the moon on chariots propelled by "swans of the East Indies", as Bishop Godwin, writing in the Seventeenth Century, put it, or in a balloon, as Poe pictured it in his "Adventure of One Hans Pfaal", or, again, in the cannon projectile of Jules Verne. He would then discover for himself the forms taken by Nature's creations.

These dreams of scientists and men of letters alike, until the dawn of the present century, were not burdened by the grim difficulties of the interplanetary journey. It was not until the nature of interplanetary space was determined that the fanciful means of interplanetary travel were abandoned and a real science of spatial navigation erected. Similarly, it was not until high-powered telescopes, and the spectroscope, had been trained on the moon and our sister planets that airy speculations about their inhabitants yielded to analysis of what life they really could support.

Fancy, then, has been displaced by science, and through science man today has in the rocket ship a vehicle that in theory at least can lift him away from the earth across airless and heatless interplanetary space to the moon a quarter of a million miles away, or to the distant planets, Mars and Venus. And in a half dozen nations scientists of the highest repute are laboring on the giant that slumbers in the rocket to make the theory a reality. When their work has been completed, and an interplanetary ship is built, the experiences that man will enjoy on his journeys into the great spaces and upon our sister worlds will no doubt be more fanciful than our wildest dreams!

Are we on the threshold ready to reach out into space for new knowledge? Is man soon to go outside the atmosphere of Earth and travel by rocket ship at great speed, even to other celestial bodies? Mr. Lasser, who is President of the American Interplanetary Society, thinks so and has written this article about what he thinks. Undoubtedly it contains physical conclusions susceptible of debate, but this story may, at least, stir the imagination as to what Science has before it. Incidentally, our artist, Mr. Jex, wishes to disclaim any intimate knowledge of Mars and interplanetary travel. In fact, he has never made such a trip and says his illustrations are pure figment.

To appreciate the nature and significance of an interplanetary journey, it is necessary first to understand the craft which is to transport us. The rocket in simplest terms is a form of recoil instrument. A charge of explosive is burned in a combustion chamber, and the resulting gases exert a tremendous pressure upon the chamber walls pushing the rocket forward at the same time that they are exhausted to the outside. The action is similar to the recoil of a rifle—the explosion of the powder not only sends the bullet on its way but also kicks

LOOKING BACK UPON THE EARTH FROM THE ROCKET

Our globe as it might appear to the occupants of the interplanetary ship en route to other spheres

the gun emphatically against the rifleman's shoulder.

By its ability to accelerate slowly in order to arrive at the speed of seven miles per second, necessary to escape fully from the earth, and because it operates in the vacuum of interplanetary space, the rocket is peculiarly fitted for the great task imposed upon it. It can make the fullest use of the tremendous powers latent in the explosion of hydrogen and oxygen, as well as other fuels, and combat successfully the relentless pull of the earth upon its children who hope to escape her.

As yet no rocket fuels have proved in test that the technical problems have been solved. Nor have rockets in flight gone high enough to yield revolutionary results. But month by month during the past two years progress has been evident. From flights of a few hundred feet, rockets have ascended six thousand feet, and plans are now in progress in Europe and America to send them up from five to two hundred miles. A recent grant to Dr. Robert H. Goddard, an eminent American physicist, of $100,000 by the late Daniel Guggenheim is allowing Goddard to carry out with freedom his ambitious rocket experiments.

Also working in America is the American Interplanetary Society, lending organized support to the interplanetary project and planning experiments of its own. Abroad, the powerful German Interplanetary Society has made that nation rocket conscious, and at its rocket flying field in Berlin its engineers are making headway against the numerous technical difficulties. In France, under the leadership of Robert Esnault-Pelterie, a distinguished aviation engineer; and in Russia and Austria, other groups are attacking vigorously the barriers that block our way to the heavens. The dream of the interplanetary flight that was once a weapon for satirists, a butt for ridicule, a dream of theorists, is now on the way to becoming an experience possible for the race!

To convey to a reader a true picture of an interplanetary journey would require a great deal of space, because there is little in our own experience to equal it. Then, too, since we have never travelled into interplanetary space, our picturing of the sensations and experiences must be drawn heavily from conjecture.

We do know that the start of the journey, whether to the moon, or Mars or Venus, will probably be made at night, and at a rigidly predetermined hour. The flight will be based on a mathematically plotted curve through the heavens. There we will have no mapped road, and only the heavenly bodies as signposts. We must use their positions in the heavens to guide us to our destination on a path as exacting as science can make it.

At the start we will be lying in a metal-walled cabin of the rocket ship, in comfortable bunks, because the acceleration at the start will be so great that an unbearable pressure would force us to our knees, were we standing. Lying down, we can breathe easily until at a signal from the navigator a great roar sounds behind us, and simultaneously the hand of an invisible giant presses us to our cots. For ten minutes, this pressure, growing more and more unbearable each moment, continues. It is the pressure of our acceleration through the atmosphere of the earth, and it is as if a load of twice our own weight were resting on our bodies.

But at the moment when it seems that the pressure

could not be borne longer, it gradually begins to relax. The weight is removed by the invisible giant, and we begin to breathe more and more freely. The roar from the rocket exhausts has somehow ceased and we learn that the power has been shut off. A speed of more than seven miles a second having been attained, we are forever free of the earth.

We look out of a window at the side of the cot and see with amazement that our earth, fifteen hundred miles below, has shrunk appreciably in size. We are looking upon its night side, and slowly, ever so slowly, it turns its darkened oceans and continents toward us.

Then another sensation becomes unpleasantly evident. The pressure resting upon us has wholly disappeared. But then it is as if the cot beneath us were gradually withdrawn, or as if we were lifted gradually from it. A feeling of a lack of support beneath us becomes painfully clear, and for an anguished moment one feels as if he were falling through space!

But the comfortable walls of the cabin are still about us; the sensation of falling, we learn, is that state of "weightlessness", just an accompaniment of flying through space without power. There is not a

FREE OF EARTH
The rocket sails into space with its course charted to the moon, or Mars or Venus

sound, no sense of movement, no single indication that we are fleeing from the earth at two hundred times the speed of an express train.

When we get up, it is with care, for since we weigh nothing now, a single false step would send us shooting painfully to the ceiling of the room. And as we discover later, our whole lives must be reorganized to these strange conditions of space. We cannot eat, drink or bathe as on earth. Water, being weightless, will not pour, nor will it remain comfortable in the bottom of a tub or basin. All free liquids will float about a room disconcertingly in small globules; and to drink, one must squeeze his liquids from a soft, flexible flask. And to breathe, in this sealed vessel, we have a ventilating system that automatically sends through every room a stream of air, of the pressure and constituency we are accustomed to on earth. Impurities are changed chemically and the air revitalized for further use.

Hour after hour the ship will speed on silently, because its trip to the moon will consume possibly a day and a half. For a journey to Mars or Venus thirty to ninety days may be necessary. The trip in either case will need all of one's faith in the trustworthiness of the ship and the ability of the crew to take him safely to the longed for destination. One will not travel directly toward Mars or Venus, but rather toward a point in the heavens where these bodies will be when we arrive. While we are moving these worlds are moving too, and our course has been plotted to effect a meeting with cruel accuracy. No room is left for chance or dallying in space. Disaster by a collision, or being lost in space with no fuel is the alternative to tampering with the iron laws of spatial navigation.

But the hours, or days, of the journey will pass. Aflame in the sky, the intolerably blazing sun will throw hundreds of miles into space its gigantic prominences, while ringing the orb will be its incomparably beautiful corona, seen on earth only at times of an eclipse. The sky, even behind the sun, will be a deep, fathomless black, while the stars, billions of them, now, will shine out with a brilliant, hard, steady light.

A day will come when we will feel ourselves to be flotsam in an eternity of emptiness. Time, motion, space will all have ceased to have meaning.

As day after day passes in the changeless sky, doubts will arise as to whether Mars or Venus will be at the appointed meeting place at all. The earth will have shrunk to a ball, then to a disc, and finally to only a glowing point of light in the heavens. The emptiness will seem infinite. We will take observation after observation on the stars; check and recheck the speed and course, and wait feverishly for the approach of the new world. Doubt will change to fear and then to terror as the weeks bring only increasing loneliness and monotony. A hundred times we will believe ourselves lost, and like the first navigator of the Atlantic we will be assailed by the panic-stricken crew to turn back before we perish miserably in the infinite space.

We will have to fight these things, against a certain doubt of one's own sanity as the terrible stillness of space envelopes us. But if faith triumphs, we will at last find its justification in the growing disc of Mars or Venus in the skies. We will see it day by day, as its path gradually converges with that of the ship. It will grow from a small to a large disc, then into a gradually expanding ball. From an unblinking star, it will become a round, fair young world. And as we adjust at last our course to circle the planet or land on its surface, we will find that we have acquired from this experience the steel and strength of a cosmic faith which we will hold forever.

To ask what we might find upon the moon, Mars or Venus to compensate for the labor, expense and torture involved is to expose our ignorance and our unconscious desires.

We know that we hope to find, most of all, a form of reasoning being not too unlike ourselves, with whom we may establish some communication. The thought of possible life upon the planets arouses at once the picture of something resembling human beings. But, sadly enough, we ask too much to expect Nature to duplicate upon another world, of totally different conditions, the product of millenniums of earthly evolution. That we shall find life at all, animal or vegetable, is enough to excite the imagination and make the journey worthwhile.

We know quite definitely that the visible side of the moon is airless, waterless and gives little promise of any life upon its surface. But what may exist on the side that has been perennially hidden from us, or what may exist beneath its surface, we do not know. We do know that horrible extremes of temperature prevail upon the moon, and even without the airless condition of its surface it could not support life of any kind with which we are familiar.

But on Mars and Venus, the hope of finding life forms, even in an advanced stage, is quite good. We know that Venus has an atmosphere, though its constitution close to the surface is unknown. Its surface temperature is within a livable range, and there is undoubtedly water on its surface in which life, such as we know it, might germinate. But the form that such life may take may be beyond our wildest imaginings.

It has been suggested that Venus is a younger world than the earth, that it is in the condition the earth was ten to twenty millions of years ago. If that is true, it is possible that it possesses a great variety of primitive life forms, comparable in a remote way to those that once graced the earth. Some of these may have developed under the peculiar Venusian conditions rudimentary states of intelligence. But certainly, if Venus is the semi-tropical world that its temperature and thick cloud layers indicate, it will be a veritable paradise of wonders for the naturalist as well as the anthropologist and experts of other natural sciences.

On Mars, too, physical conditions permit the existence of life, though such life would probably be of a specialized character. For, with its extremely thin atmosphere,—containing only a small fraction of the oxygen and water vapor of the earth's blanket, and its temperature range from 72 above zero (Continued on page 320)

FROM A PAINTING BY CARL RUNGIUS COURTESY, THE U. S. BIOLOGICAL SURVEY

THE WHITE SHEEP OF ALASKA

Their kingdom is the mountain range, but they venture into low country for the willows, grass and lichens that make up their diet

BIGHORNS OF PLAIN AND PEAK

BY VERNON BAILEY

CHIEF FIELD NATURALIST, U. S. BIOLOGICAL SURVEY

OF ALL the animals of the West, two stand head and shoulders above the others in their romantic appeal. One is the buffalo, shaggy, courageous warrior of the plain, a tragic figure whose associations both with Indian and pioneer and whose greatness both in size and number capture the imagination. The other is that monarch of the badlands and the mountain tops—the mountain sheep, with an Asiatic tradition behind him and a way of demanding universal admiration for his recklessness, his supreme agility and power and his unequaled sense of balance. Yet, curiously enough, both of these picturesque characters lacked sufficient appeal to save them from ruthless slaughter for their meat and skins. It is only lately that the bison has become safe from extinction; and except in the National Parks, the bighorn is not given any truly adequate protection.

Compared with some of the Old World countries North America is poor in native sheep. Asia and Europe seem to have been the centers of dispersal for these species and there is some reason for believing that the ancestors of our North American bighorns came across from Siberia to Alaska in ancient times and then worked their way down through our western mountain ranges to northern Mexico. Some are still close to Siberian species, although we have none to equal the

DISPUTING A MOUNTAIN PASS WITH HORN AND FOREHEAD
A young and old ram struggle for right of way high on the slopes of a mountain in Glacier National Park

huge *Ovis poli* and *Ovis ammon* of the mountains of central Asia.

The little long-tailed woolly domestic sheep of unknown Old World origin have no native representatives in America, although introduced in early colonial days and now found in great numbers across the continent. While they furnish much of our food and clothing and are vastly important in our human economy, they are sadly uninteresting to the naturalist and the lover of native wild life.

Our North American bighorns are all of the large, heavy-horned, coarse-haired type, varying locally in size, form and color, but devoid of any visible wool. A thin film of fine wool, however, may be found close to the skin, well hidden by the long outer hair of the surface coat, and forming a light woolen undergarment of some importance that possibly is a connecting characteristic with some common ancestors of all the sheep.

There are two species or groups of sub-species of wild sheep in North America, with distinct ranges and characters that seem not to meet or overlap. Both have close relatives in the Siberian mountains where they also remain distinct. The southernmost of these two groups is represented by the heavy-horned brown sheep of the *Ovis canadensis* type, and with some ten or a dozen recognizable geographic varieties or sub-species.

Ovis canadensis was the first scientific name applied to any North American sheep and the type form from the mountains of Alberta and British Columbia still ranges southward through the Rocky Mountains to Colorado and northern New Mexico. East and west and farther south slightly marked sub-species have developed on different types of ranges, with at one time almost or quite continuous distribution and more or less intergradation of characters. Some of these forms have been crowded out by settlement of the country and all have suffered restriction of range, but a few are still represented by numbers that can be permanently maintained or increased under proper protection and management. The species and sub-species are listed at the end of this article, and the accompanying map will locate their ranges.

Originally the bighorns covered almost all of the mountainous country of the West and came well out on the Great Plains where there were badlands, canyon walls, high river banks or any land rough enough to afford escape from their natural enemies, the wolves, coyotes, mountain lions and bobcats. Naturally slow, defenseless, and edible animals, they had no means of escape from the large meat-eaters except by climbing on the rough cliffs and shelves of rock or up steep banks. With suitable buttes and mountains for refuge, they often became so numerous and bold as to venture across valleys and plains to other rocky ranges and so became widely distributed.

In 1887, on my first western trip, bighorns were still scattered widely over the badlands of the Dakotas and eastern Montana, and George Bird Grinnell, Theodore Roosevelt, Audubon, and Maximilian tell of their earlier abundance along the Upper Missouri and Yellowstone Rivers back for a hundred years or more.

They have long since gone from the plains country, where they were rapidly killed off when firearms came into use and the country was settled with ranchers. The badlands sheep, named *Ovis auduboni* for John James Audubon, apparently has been extinct for some years.

This was inevitable as its range is now occupied by innumerable homes of thrifty settlers, and domestic stock now grazes over the hills where it once ranged. We regret that it is gone. With a little foresight on our part a good-sized refuge of badlands not valuable for other purposes could have been set aside to preserve a remnant of its type for general interest and for breeding to restock public and private lands. The day may yet come when we shall become sufficiently intelligent to utilize our native game animals both for pleasure and profit.

Another bighorn, the rimrock sheep of the low country, with potential value to man, has only recently disappeared from the lava beds and buttes of eastern Oregon. In 1829 it was given the name of *Ovis californiana* by David Douglas, the Scotch botanist, who described it from a skin he saw an Indian wearing as a shirt, and a pair of horns that he picked up near the mouth of the Des Chutes River in Oregon in 1826. These sheep were abundant then over most of Oregon east of the Cascades and were still there up to a few years ago. They lived in the low country and could have been domesticated right on their native range.

Later, as the herds of domestic sheep swarmed over these rich grazing grounds, the bighorn rams often came into the herds and knocked over any of the smaller domestic rams that were foolish enough to give battle. Now this lowland species is gone from a wide area. We would like to be able to bring it back and give it refuge, but we are too late.

The desert sheep, *Ovis nelsoni,* from eastern California, southern Nevada and western Arizona, is another lowland species of the hot desert mountain ranges. A few still cling to the more inaccessible cliffs and crags of their original habitat, and by merely protecting them and letting them become reestablished on their native ranges much of this desert country would again become interesting, at least, and eventually might gain value.

In *California Fish and Game* for April, 1924, H. E. Ober shows photographs of two of these big native sheep with an Indian goat-herd in the Panamint Mountains near Death Valley. They were tamer than the goats and when called would jump the corral fence and run to the house to get a crust of bread or a pancake. They were not fully grown rams but took delight in knocking over the largest billy goats in the herd. They were friendly with the Indians, who were much attached to them.

In these same mountains in 1891 every spring and water hole had old blinds built of stones from which the Indians could shoot the sheep with bows and arrows at close range as they came to drink. Apparently they were no wilder than our present range stock. They must have been invaluable to these scattered bands of desert-dwelling natives and were not reduced in

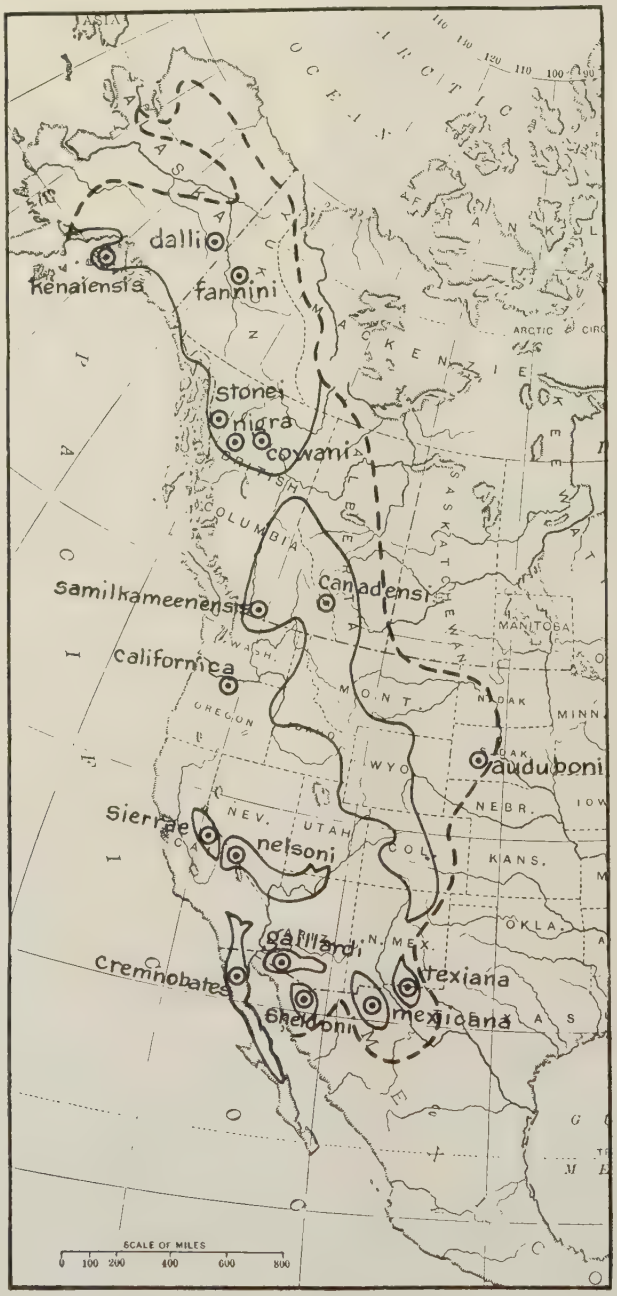
MOUNTAIN SHEEP ON THE UPPER MISSOURI

The sheep occupied nearly all the badlands and rough, rocky country in the plains region before the white man's advent. This painting by Carl Bodwar, artist for Maximilian, of the Stone Wall below Great Falls, Montana, was made in 1833

numbers until white men swept over the country.

The Indians know and a few old timers and hunters still appreciate the fact that the meat of the mountain sheep is far superior to that of any other wild game in this country and to that of any of our domestic animals. It is as rich and tender as lamb, and lacks the woolly flavor of this meat.

There are other southern sheep of more or less closely related sub-species living in low desert ranges in southern California, Arizona, New Mexico, and northern Mexico, but they are now few in numbers and widely scattered, living often where there are long periods without rain or any available water and in barren country where no other large game animals could live. They are far from settlements and in the most inaccessible localities, where they are generally given little protection. If their real value and interest were known a greater effort would be made to guard them from the occasional wanton destruction that has nearly wiped them out of existence. They have enough natural enemies, in the form of cats and coyotes, to take most of the increase without any additional destruction by man. With some of their enemies eliminated they would increase so fast that their ranges would soon be overstocked.



HOW MOUNTAIN SHEEP ARE DISTRIBUTED

On this map appear the type localities with names of species and sub-species. The broken line represents their original range; the unbroken their present range in the West

The biggest and best of all the sheep is the Rocky Mountain bighorn, *Ovis canadensis*. It is holding its own over a great part of its original range in the high central mountain country from British Columbia to Colorado. In such well-protected areas as Glacier and Yellowstone Parks it is possibly increasing.

This creature is the largest, finest sheep of North America, but living in its arctic zone on snowy peaks it is not well adapted to domestication in the low country. Until recent years it could be kept in captivity in any low country only with difficulty; but, fed entirely on dry food, it has lived and bred in the National Zoological Park in Washington, D. C., for many years, and has shown a surprising increase on wild food in the Bison Range in Montana. It does not enjoy the heat of summer but may in time become fully acclimated and adapted to low altitudes.

This species is as gentle and easily handled as any domestic sheep and in the mountain parks in winter soon learns to come when food is provided and to take food from the hand of anyone who knows how to approach wild animals without making them wild. Even in summer in Glacier Park I have coaxed sheep close enough almost to reach the cracker held out to them and in Yellowstone Park those on Mount Washburn and Specimen Ridge are tame enough to afford many good photographs and moving pictures.

The time will surely come when many of our native animals will be on as friendly terms with man as are the cattle and sheep and horses, tamed long ago by our wild ancestors. We need to relearn some things we forgot long before America was discovered.

The northern group of white, gray and black sheep of smaller size, with relatively more slender and more spreading horns, are represented by Dall's white sheep, *Ovis dalli*, and four or five generally recognized sub-species dwelling in Alaska and northern British Columbia. They range from the snow white *dalli* and *kenaiensis* to the gray-backed *fannini*, and almost black *stonei, cowani*, and *nigra*. Some of the forms are so close together as to suggest mere color variation in a scattered herd. Their small size and slender, yellow, angular horns seem to separate them sharply from the *canadensis* group to the southward and do, in fact, connect them closely with the snow white *Ovis nivicola* of eastern Siberia. (Continued on page 325)

MY "WILD" FRIENDS

BY CYRIL E. LAMB

PHOTOGRAPHS BY THE AUTHOR

READY TO SING

Father thrasher, who utters alarm notes while the mother is off the nest, prepares for joyous wassail as she returns

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UNAFRAID OF MAN

After several days' effort, the author was able to photograph the birds without blind or subterfuge while they posed

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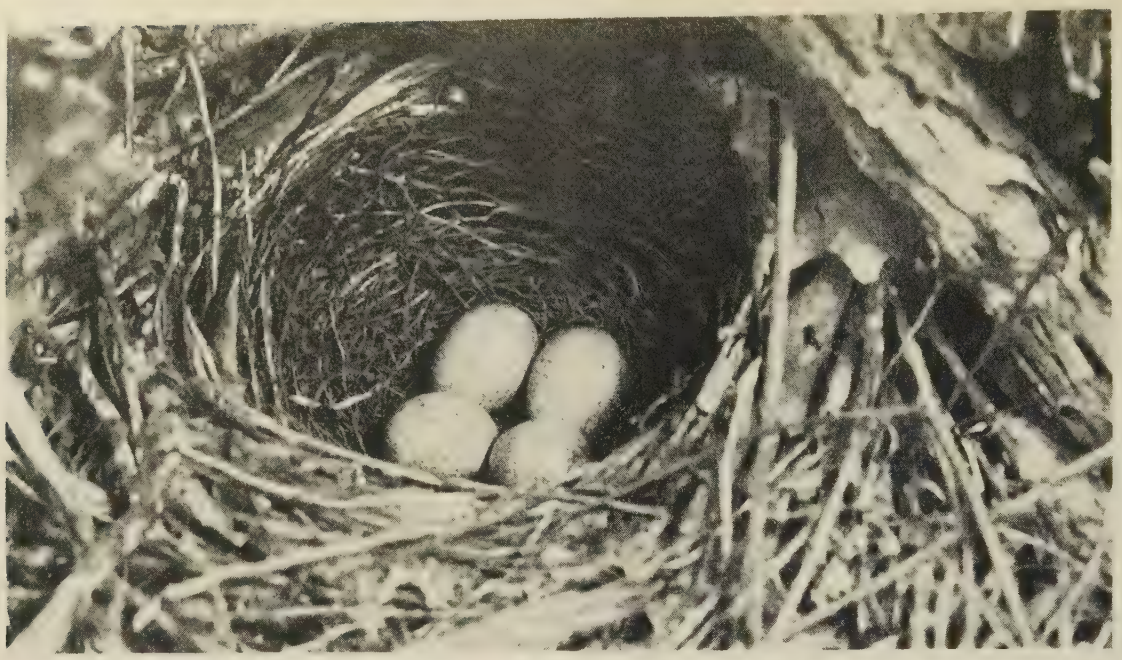
ABOUT TO BROOD

The female is filmed just as she pauses on the edge of the nest before caring for her family of four youngsters

Good pictures of birds, whether taken from a blind or by use of a trip cord, always thrill the amateur photographer; but the pleasure they bring is infinitesimal compared to the delight of filming these feathered folk with the camera held in the hand, especially when you catch them engaged in those parental duties of the spring-time. So anyone owning a camera will pardon my enthusiasm if I relate how a pair of the most beautiful and useful of our northern birds, the brown thrasher, gave me their confidence, and let me stand close by the nest and photograph them while they started their children on the way they should go.

The nest of this handsome couple was built of fine interlaced twigs and root tendrils, and was located in a hollow scooped out of the soft sand beneath a small oak tree, instead of in the more usual location among the lower branches of some tree or bush. When discovered, it contained the customary four bluish-white eggs with their fine, clear markings of reddish-brown dots.



WHERE THE PRECIOUS EGGS LAY HIDDEN

A hollow scooped out of the soft sand beneath a small oak tree formed the foundation for the nest and eggs of the brown thrasher

Mother thrasher, who was sitting upon her treasured eggs when I found her, flew off with a great scolding, and fluttered about with much alarm, and a great display of temper. Her bright yellow-and-black eyes fairly flashed fire. The male bird likewise showed his courage by several times flying at my head.

Stepping up to the nest, I quickly photographed it and the eggs, being careful not to touch it or disturb the surroundings, and then set up the camera on the tripod, with the usual long thread leading to a distant place of concealment so I could obtain a picture of the bird on her nest. One or two trials convinced me that the creatures were not alarmed by the sound of the camera shutter, and I began to draw nearer and nearer. It then occurred to me that it might be possible to obtain pictures with the camera held in the hands.

No success attended my first day's efforts along that line, but the birds gradually became accustomed to my walking close to the nest. At last I was able to snap a picture just as the female catapulted herself into the air at my approach. On the second day the eggs hatched, and the parents were so solicitous of their young that they permitted me to approach almost within arms' reach before they fluttered away for a few feet.

Standing perfectly motionless, with camera aimed at the nest, I photographed the female as she paused at the edge of the home before settling down to the serious business of brooding the youngsters, and a moment later snapped her again in a most comfortable pose.

The male, which, incidentally, can scarcely be distinguished from his mate, fluttered about the nearby trees and bushes, and so long as the female was off the nest uttered a continuous series of alarm notes; but the instant she came back he pointed his bill toward the heavens and poured forth a burst of joyous song. He then dropped to the ground and began the usual work of gathering worms and grubs from beneath the dead leaves and litter on the forest floor.

A "WILD" FRIEND AT HOME

The mother contentedly brooded her young before the camera's glassy eye

Throughout my visits with my newly-

found "wild" friends, however, neither of the adult birds would feed the young as long as I was near, although they would take turns brooding the youngsters; thus each of the parents was given an opportunity to eat.

The male bird flitting from branch to branch in the vicinity of the home proved a much more difficult subject than when on the nest, but by following him with the lens of the camera, and pressing the shutter release when he paused for a moment in some good position, I was finally successful in obtaining several views of him.

Before the young were sufficiently large to permit setting them out to photograph them our vacation days came to an end, and the series of pictures of my new friends likewise ended, but they form one of my most valued collections of photographs, and bring vividly to mind the hours spent in gaining the confidence of these wary wilderness creatures who are usually so timid and distressed when brought into close proximity to man.

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BLACK-CHINNED HUMMERS

NOTES ON THEIR NESTING AND WOOING

• • • BY JULIUS L. COLLINS

WHAT tiny bright-eyed baby birds they were, snuggled closely in their little nest of plant down and spider's webs decorated with bits of gray-green lichens! The nest was placed on a limb about one-half an inch in diameter in a dense hedge of Monterey cypress and about breast-high from the ground. It was almost invisible against the gray-greenish background of the trees. When first found it contained two tiny birds

THE TWO YOUNGSTERS WAIT FOR FOOD

Beginning life as small as bees, they grow rapidly until only one has room in the nest

about as large as honey bees and without feathers, but they grew rapidly and became so large that before they left the nest it would accommodate only one at a time, the other one being forced to sit on the edge and wait his turn.

These birds were black-chinned humming birds, so called because of the black gorget at the base of the bill.

FRANCIS DICKIE

MOTHER BLACK-CHINNED ON THE NEST

She does all of the work of feeding the young, while the male watches

They are also sometimes known as purple-throated hummers, from the narrow purple band below the black.

The nestlings were cared for entirely by the mother bird, who fed them insects mainly. The father took no part in the rearing of the young.

The wooing of these birds as described by Wheelock in her *Birds of California* is very interesting: "Should you spy a male, swinging sidewise back and forth through the air, pendulum fashion, look for the dainty little lady on a twig about three feet in front of and a little above him. So absorbed is she in watching and he in performing this curious aerial dance, that neither will notice you. Sometimes at its finish he will drop exhausted on any perch near and pay no further attention to her, but oftener I have seen her dart out into the sunlight as a signal for him to follow, and a merry chase through the blossoms followed. Once, as he sat resting after his graceful and apparently effortless swinging, the female flew toward him, lit daintily a few inches away and quivered her iridescent wings. Instantly both birds were in the air apparently engaged in a mortal combat, and then he was back upon the perch like a flash of light while she had disappeared." They are truly a source of constant delight.

PLANTS THAT CATCH FISH

INDIAN DEVICES FOR CAPTURING THE TROUT

BY LESLIE L. HASKIN

THE PLANT THAT STUPEFIES TROUT
Camphor-weed, or blue-curls, was much used by the Indians to provide them a store of fresh food from the mountain trout streams

As small boys at the "old swimming hole," we used to amuse ourselves by stirring up as much mud as we could, and beating it to the blackest and thickest consistency imaginable. After we had done this, the small chubs and "shiners" that inhabited the pool would be so overcome by the smothering mess, that, to gain oxygen, they would rise gasping to the surface, and lie struggling and flopping in plain sight, easy victims for our covetous hands. The largest of these fish we carried proudly home to be fried and eaten, for when crisped to allow their being eaten bones and all, we considered them the most delicious of all food. The smaller ones—minnows so tiny that even our indulgent mothers refused to cook them—we returned to the pool, or placed in a tiny spring-brook near at hand where their habits could be more easily observed.

We never dreamed at that time—the muddy, naked imps that we were—that we were using one of the most primitive of all ways for obtaining food, or that anyone had ever practiced this craft as a serious business; but such, indeed, was the fact. Before America was discovered, the Indians of the Pacific Coast were using this very method, and had so improved it as to make it far more easy and efficient. Our system would work only in stagnant, muddy-bottomed streams—theirs was equally effective in the clearest rivulets. While we used mud alone to smother the fish they added certain rank-smelling plants that had a stupefying effect upon their finny prey. These plants thrown into the water—with or without the addition of stirred up mud—had a result similar to our smothering baths.

Let us picture a clear mountain stream in Oregon or northern California one hundred years ago. It is August, and the river, a roaring torrent in winter and spring, has dwindled away until it is reduced to a succession of deep pools. Growing thickly on some of the dry flats surrounding this stream, and imparting to them a blue tinge from the abundance of their peculiar flowers, is a plant of the mint tribe. *Trichostema lanceolatum,* the botanists call it, but its common English name is camphor-weed, from the peculiar and exceedingly strong scent of its foliage.

Upon this scene—so quiet and undisturbed—suddenly bursts the hurly-burly and confusion of an Indian tribe emigrating to the huckleberry fields of the higher mountains. At the sight of the stream and the blue-flowered plants, the whole tribe breaks into rejoicing, for they know that each deep pool is fairly swarming with trout, and here is a chance to vary the monotony of their late

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TURKEY-MULLEIN

Another Indian trout-catcher. By stirring with it the water of the stream fish were compelled to come to the surface to breathe

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summer diet. At once some of the men commence to gather slender willow withes from the stream bank, and from these they weave close-meshed weirs which they place at the upper and lower entrances of the pool to prevent the fish from escaping. In the meantime the girls are collecting quantities of the camphor-weed from the surrounding flats. The weir being completed, great armfuls of the weed are thrown into the pool, and in among the floating plants leap the boys and young men, beating and churning the water with all their strength, until it is thoroughly impregnated with the rank scent of the plants. This quickly stupefies the fish, and they float to the surface and are cast out on the bank to be gathered up by the women. The whole tribe soon feasts upon their rich, delicate flesh.

The scent of the camphor-weed is most peculiar—it smells like a mixture of camphor, turpentine, and glacial acetic acid. The odor is very strong, and a full breath

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WILD CUCUMBER

Also called "man-in-the-ground". Its roots were mashed to a pulp and cast into pools to suffocate the fish

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drawn from a closely packed bundle of the fresh leaves is nearly enough to knock a man down. Another name sometimes given to the plant is "blue-curls," for the peculiar narrow tubes of the corolla and the long exserted stamens are blue and pleasingly "curly" in appearance.

Another plant of marked value in obtaining fish is the amole, or soap-plant of northern California, a member of the lily tribe. Its macerated roots, when beaten with water, produce a rich, creamy lather with marked cleansing qualities much valued by the Indians and early settlers, and still preferred by some persons both for toilet purposes, and in washing fine lawns and laces that might be injured by ordinary commercial soaps. Used in pools as a fish poison, it is very effective. Had we, as boys, used this cleansing root instead of a lob-lolly of rich, sticky mud, our mothers might more often have smiled upon our piscatorial efforts, instead of seizing us by the ear, and marching us grimly away to the bath-tub.

Long cooking frees the soap-root of its somewhat poisonous qualities, and makes it fit for human consumption, so that this remarkable plant furnished the natives not only with soap and fish, but with bread as well.

Ranging over an almost identical area with the camphor-weed, is another plant that was used in the same manner. This is the turkey-mullein, or fish loco-weed, as it is often called. Its scientific name is *Piscaria setigera,* a name which refers to its well known use. The turkey-mullein is a low-spreading plant, with inconspicuous flowers and rank-scented woolly leaves. It grows on gravel banks along streams, and in dry soil from the Columbia River southward into California. It is a member of the spurge family, most species of which are recognized as having some poisonous qualities. Turkeys and wild pigeons are very fond of the seed of this plant. These seeds are about two lines long; they are gray with stripes of dark brown, and when fully ripe are ejected from their pods with a sharp snapping sound to a distance of ten or twelve feet. Used in the same manner as the camphor-weed, the turkey-mullein is very effective. Some Indians declare that its value is not due to its rank scent or to any poisonous qualities that it has, but to the stiff, sharp hairs of the leaves and stems, which penetrate the fishes' eyes and drive them wild with pain, so that they dash about and soon exhaust themselves. This statement, however, seems never to have been definitely proved.

Most persons are familiar with the common wild cucumber, an annual vine much grown for ornamental purposes throughout the eastern states. On the Pacific Coast, from Washington to California, there grows a perennial vine of the same family and much resembling it. This western vine, *Micrampelis oregana,* is also called wild cucumber, but more frequently goes by the name of "old man," or "man-in-the-ground." The root of the plant is responsible for the last two names, and is one of the curiosities of Nature, for it attains an immense size, often measuring a foot or more in diameter, and from one to five feet in length. This immense, overgrown rhizome is somewhat woody, but is full of an abundant and very bitter juice. Lacking a convenient supply of camphor-weed or turkey-mullein with which to secure fish, the Indians dug these roots, and mashed and bruised them into a fine pulp to cast into the pools.

The seeds of the Oregon "old man" are very plump and fleshy. Squirrels and some birds seem to eat them with impunity, but they are reputed to be poisonous to human beings. It is said that they were sometimes used by the Indians as a means of committing suicide, and also that they were fed to old and decrepit members of the tribes as an easy way of getting rid of them.

Last of all, the seeds, leaves and shoots of a tree, the California horse-chestnut, were sometimes used as a fish poison. The fruit of the horse-chestnut is certainly poisonous when raw, and stock is sometimes made ill from eating of the foliage, but this toxin does not seem to be freely given up in water, or has a minor effect upon fish, for it was only used when other more powerful plants were not readily available, or could not be found at all.

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SILENT SENTINELS OF THE MARSH—REPRODUCED FROM AN ORIGINAL PAINTING BY CARL KAPPSTEIN

TRAPPED IN THE SAND

WE SEE A TRAGEDY ON A CALIFORNIA BEACH

BY DALLAS LORE SHARP

ILLUSTRATED BY R. BRUCE HORSFALL

I was on the California beach. A bright spring sunshine flooded the Sierras and the sea. If westward lay a low bar of fog, there was no sign of its sweeping in and blotting out the beach as it had done the day before. The Commander was with me. The ebb had turned, the tide already feeling the long shoreward impulse of the Pacific. The slanting beach was alive with Hudsonian curlews, long-legged, long-billed birds of mottled brown, that would rise and fly up shore a little distance as we approached them. They were strangers to me, dwellers of the far north, their large size, their strange shape, and strange probing habits investing the beach with a wild strangeness.

We had sauntered for a mile or more, the curlews rising ahead of us, when we noticed a bunch get up and circle out over the water, leaving one of their number before us on the sand. This was singular, and instantly something in the attitude of the solitary bird caught our eye, for it stood still, its long beak in the sand, its body sagging back a trifle as if braced and pulling, or hanging off as a horse will sometimes on his halter.

"That bird's in trouble," said the Commander, as his practised eye took in the situation. "He's fast in the sand. A bivalve has hold of him."

We had halted, expecting to see the bird free himself and fly off up the beach. It seemed incredible that a clam, buried in the shore, could have trapped a wild, knowing beach bird, and one that was almost as large as a bantam. Then the curlew began to struggle—its wings drooping, its feet far apart.

We drew a little nearer to the prisoner—slowly, so as not to frighten it more; but seeing us coming it began to throw itself from side to side and try to twist itself free. We stopped and backed away. It might work itself loose; but it only sagged back upon the sand, its strength and nerve gone.

Then a big wave broke, and a thin licking tongue of water, edged with froth, ran up the shelving sand and

touched the curlew's feet. The Commander started forward involuntarily. Another big wave and the struggle would be over. If quick, we might save the bird before it could do itself harm; but we had hardly taken a jump forward when the curlew with a desperate wrench had set itself free, a staggering, bleeding bird with a stump of a bill, reeling away to die miserably.

So that bright day was touched with gloom. Neither of us could blot out the scene. We were haunted by the tragedy, even by our blundering part in it. For what a mercy had we let the next great comber end the story, and carry its own to some far-off curlew home where all broken bills are mended, and no curlew slowly starves because it can no longer probe the fat sands of the shore!

We dug into the fatal spot, bringing up a beautiful, polished clam, the Great Tivela, *Tivela stultorum.* It lay about two inches below the surface, not a large shell, for it had reached only about half its maximum, being exactly two and three-quarters inches long by two inches wide, and one and one-eighth inches thick. But it lay hinge down like a flaring wedge in the wet, packed sand, and no bird of the curlew's size could possibly have pulled it up. At a point near the middle of the tight-shut, heavy valves was a fresh nick in the shell. That chipped spot told the story. On opening the clam we found inside, below the chipped place, the nib of the curlew's bill.

The bird had been probing the shore for breakfast, and doubtless had spied the tip of the extended syphon of the hidden clam, or probably had seen its squirt of water from its feeding hole in the sand, and thrusting the long, flexible beak into the hole had pierced the open, spring-hinged valves. The powerful adductor muscles at the stab of pain worked like lightning—and the trap sprung. Nothing but the blade of a knife could have made those muscles quit their deadly hold.

In the December and January issue of Nature Magazine will be published what we believe to be the last hitherto unpublished writing of the late Dallas Lore Sharp, that beloved and gifted writer-naturalist. This essay bears the title "The Master Word," and in it the author seeks to show what is that master word of the world of Nature.

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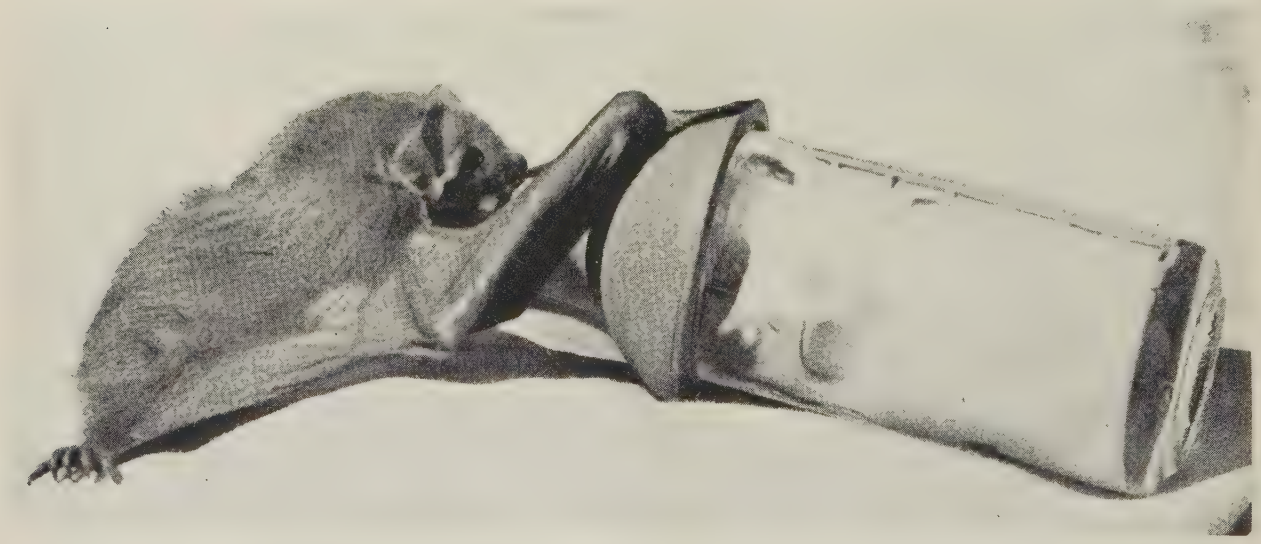


PERFORMING A REGULAR BABY ACT

The young bat, though far removed from humans in the line of evolution, at least could utilize a product of civilization—the doll's milk bottle

A BOTTLE BABY

BY HORACE TROUT

BABY bats, just like human babies, can hold a milk bottle and get the full use of it, only they use a wing instead of a hand to keep it in place. The photograph shows how they do it.

This baby bat's health will not be upset at all if a few little insects get into the milk—because by and by, when the tiny doll bottle is abandoned in adult bathood, its whole diet will be little bugs, gulped from the air as it flies about.

When found on a Dallas, Texas, lawn, where it had been dropped, perhaps from underneath its mother's wing, the little bat was only two inches long and was floundering about, unable to fly.

Mrs. Ida Pavlakes, its benefactor, finds that it wants to stir at night and sleep all day,—but this is a perfectly natural desire and in accord with the best baby-raising theories of the bats. She adds that they are most interesting to raise.

ALL PHOTOGRAPHS COPYRIGHTED BY THE AUTHOR

REYNARD TAKES HIS OWN PICTURE

Intent on his own business, which is getting the bait, he trips the wire that explodes the powder in the flash-pan, and the camera does its work

FOXING THE FOX BY FLASHLIGHT

CAMERA ADVENTURES ON SANTA CATALINA ISLAND

BY WILLIAM V. WARD

SANTA CATALINA ISLAND, discovered in 1542 by Juan Rodriguez Cabrillo, when sailing under the orders of the viceroy of New Spain, is the best known of the islands in the Santa Barbara Group, which lie off the coast of Southern California. During the past 500 years it has grown from a wild desert island, frequented only by the Torqua Indians and later by pirates, to a sheep and cattle land and a great resort and summer playground for the sun-loving Californians. The only town, Avalon, attracts thousands of tourists each year who come to see the submarine gardens from glass-bottomed boats, ride in speedboats, and bathe in the warm waters of the Pacific.

Fortunately all the gayety, noise and crowds are concentrated in Avalon, leaving the rest of the island free and undisturbed. A short walk from town will take one into a beautiful, hilly country covered with chaparral and scrub oak where wild animal life abounds. Such a place is Cherry Valley, located eighteen miles from Avalon on the north coast of the island. It takes its name from a grove of native wild cherry trees which grow in the upper end of the valley; and here it is I sit, in a little cabin, nervously waiting for my flashlight equipment to let me know by flash and boom that I have captured at least one of the denizens of this beautiful isle.

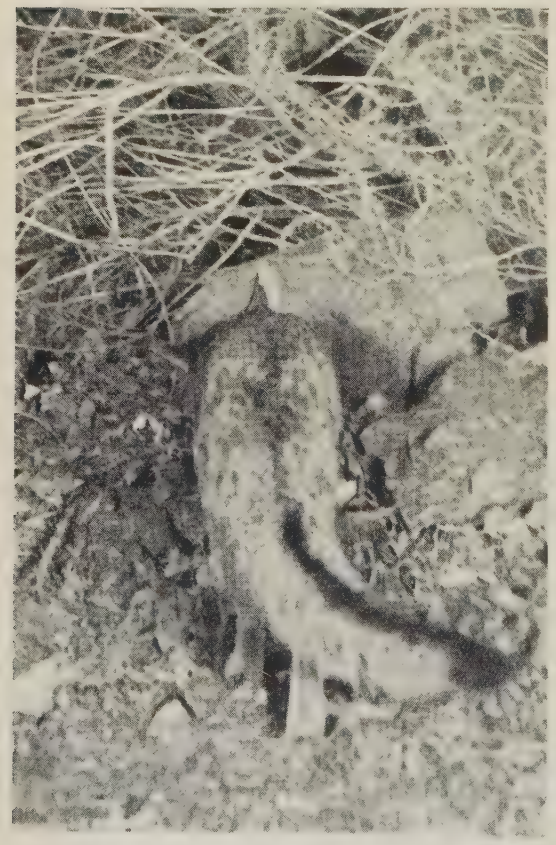
First one little fox growls and then another gives an answering bark. Soon there is a scuffle and one of them

EATING A FISH-HEAD
Any bait seemed to work—meat, fish, raisins, bread—all brought results

• • •

breaks away and runs through the greasewood bushes. Evidently they had recently caught a quail that went to roost too near the ground for its safety, and the two are fighting for the possession of the booty. They make me wonder whether they can smell the fish with which I have baited my "set-up" a quarter of a mile away, and whether by walking along the trail to get the fish, they will step into the tripping wire that explodes the flashlight powder.

I do not have long to wait. A tremendous white light fills the valley for an instant; and then a dull boom reverberates down along the little side canyons. I quickly lay down my pen, pick up a pocket searchlight and dash up the valley to the cherry grove. Sure enough, when I arrive at the set-up all out of breath, the little pieces of fish are gone and the shutter has been tripped. I look around for tracks. Here, right in front of the camera, are two deep scratches in the ground where something started to move out in a hurry. Yes, some animal has been here, and his picture is safely recorded on the camera's film. Wondering what it can be, I change the plateholders, renew the flash charges, and put out fresh bait. Then back down the valley I go, and so to bed until awakened by another explosion.



HEADING FOR LESS LIGHTED ZONES
The wily mammal of Catalina decides to hunt elsewhere for the moment, and shows off his bushy tail to fine advantage as he leaves

I must get up at five o'clock the next morning to develop the pictures, for I am very anxious to see the results. It is also only in the early morning that the water is cool enough to use for washing films, for later on in the day the sun pours down on the pipe line, making it so hot as to be almost impossible to touch. Most of them are good; but what is this one? Surely it cannot be!—but here on the film that was exposed last night are *two* foxes. They were coming down the baited trail, each one striving to pick up more fish than the other. The first fox had probably been there before, for he jumped over the tripping wire, as the picture shows; but the second touched the wire with his forefoot, thus causing a picture of both animals to be taken. The negatives are washed and while they are drying I go up into the cherry grove again to prepare another series of explosions for the following night.

Two different ways of getting the fox to pull the tripping wire were tried. In one method the tripping wire was fastened directly to the bait; and when the fox reached down and pulled the bait he took his own picture. As this gave a picture of the animal pulling up the bait, it did not show him walking along in his natural manner. The correct pose was obtained, however, by stretching the trip wire across a fox run or trail. Every few yards along the trail a piece of bait was dropped to encourage the foxes to use that particular trail instead of some other for their nightly wanderings. The resulting photograph showed the animal in a natural mood with no timidity or terror on its face. For bait

nearly anything was found to be satisfactory. Meat, fish, bread, and raisins all brought results.

Sometimes people ask me why I can be so cruel as to explode high intensity flashlight powder within eight feet of an animal. It probably does frighten him terribly, but only for a moment. He soon comes back again to look for more food and sometimes to take his picture over again. At one time I was standing about seventy-five feet from the camera when the flash went off. Immediately I went to the camera, changed the plate-holders, and reset the apparatus, after which I went a short distance away to wait and watch. It was not ten minutes before the flash went off again. Then retracing my steps, I turned a pocket searchlight toward the camera, illuminating the head of a fox. Its eyes shone like two yellow moons, which blinked and then went out as he gracefully jumped over a bush and disappeared from sight. The next morning when I returned I found the paper cover chewed off the dry battery, which was used to ignite the powder, and the stakes that held the firing line in position dug up by sturdy forefeet. Why this was done I could not guess, unless Mr. Fox had returned again during the night to get even with me for scaring him out of a month's growth.

As the foxes were the only mammals to take their pictures by night it may be safely assumed that they are the only carnivorous animals on that part of the island. Rumors are sometimes passed that skunks and wildcats also inhabit the island, but I have never seen any nor met any one else who has seen them. Birds were recorded

A QUAIL SHOOTS HIMSELF

One of the valley quail that gather around the bait for insects in the dusk despite the menace of near-by foxes

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DRAWING TWO OF A KIND

The first fox evidently jumped over the tripping wire, but the second one touched it off with his foot

SANTA CATALINA, JEWEL IN THE PACIFIC

Its rugged shores were once the haunts of pirates, but now are peopled with vacation-seekers. The island offers an interesting animal and bird life which may be found not far from the resort centre at Avalon

by the flashlight camera only when it was set too early in the evening, or when it did not go off at all during the night and they had an opportunity to scratch for insects around the bait the next morning. One of these, a valley quail, common on the island, is shown among the illustrations.

The taking of any animal photograph by flashlight is the most interesting sport imaginable. The combined knowledge of the trapper and photographer must be pitted against the cleverness of the animal to be pictured. Nevertheless, it is one of the most discouraging types of photography that ever could be indulged in. It is also expensive. Perhaps one out of every six negatives exposed is worth printing, for there is many a slip between the setting up of the outfit one evening and the developing of the negative the next day. Perhaps a twig will fall on the firing line. The flash charges may fail to go off. The animal may not be in an artistic pose. The lens may cover with dew. Connecting wires may break. Or, worst of all, a herd of steers may run through the apparatus, knocking it over and trampling valuable instruments—an accident which, most unfortunately, happened to me. But still when a good set of pictures has been taken of a subject which no one else has successfully photographed, there is an extreme satisfaction in knowing that the attempted has been accomplished.

And now that my time on the island is over and I pack my equipment for the sail back across the channel to the mainland, I know that when I arrive at home I will miss the sharp little bark of the foxes and the pairs of shining yellow eyes that mysteriously appear and disappear just outside the border of the campfire's glow.

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In the advertising section announcement is made of the plans for another American Nature Association cruise to southern waters. The idea of a small party of like-minded and congenial travelling companions enjoying specially-arranged shore trips was so popular with the group of thirty-three that travelled to the West Indies last winter, that another trip has been planned this year. The party will be strictly limited to twenty-five for the twenty-three day cruise. If you are planning a winter vacation and wish one of outstanding interest get in touch with our Director of Field Trips.

USING THE LOTUS BLOSSOM

Conventionalized, it served the Egyptians for surface designs on their pottery, their architecture and otherwise

NATURE : PATRON SAINT OF DESIGN

BY GUY EDGAR FRY

ILLUSTRATED BY THE AUTHOR

MILLIONS of years ago a diminutive shell creature settled into the slime of a shallow sea. In time this soft resting place calcified and enclosed the shell as if in a tomb. Later, when the water receded, the rocks from beneath appeared as the first permanent signs of our earth. A Greek poet saw in the fossil remains of that shell-fish an early gesture of Creation; a Latin artist saw in the same formation Nature's first contribution to ornamental design.

Upon Nature was all ornamentation originally based, and we may go so far as to say that the crude scrawlings of early man on the walls of cliffs and caves are comparable to many of the drawings of present-day artists, if not from point of execution, then by fact that the subject-matter is primarily the same—that of Nature. From these first faint illuminations on the walls of primordial man's dwelling place comes our heritage of modern interior decoration. The drawings of horses, fishes and reindeer scratched with flint upon a softer stone are replaced by our many-hued wall-papers using the same vast resources of Nature as the motif of design. Our windows are draped with exquisite materials combining an imaginative array of decorative flora with that of dazzling bird-life and our floors are carpeted with rugs that bespeak the cunning of the Orient in their intricate arrangement of all manner of natural forms.

The Egyptians were early users of the flower and insect as ornamental motives. Their conventions of the lotus blossom and the sacred scarab appear upon their pottery, costumes, jewelry and architecture. In the treasures that have come to us from that country there is basic proof that Nature was the dominating force behind their artistic development.

The Greeks captured some of the waves of the waters that lapped their shores and gave the well-known design of the conventionalized waves to their pottery, their architectural ornaments, their clothing and all their objects of art.

In like manner the Japanese have passed down to us in their color-prints records of their experiences in design as affected by local Nature. Because of the fact that Japan is a water-bound country we find the creatures of the sea in great favor as ornamental motifs. The dragons, the mountains, the birds and the cherry blossoms are also favorites and widely used in the prints of such well-known masters of the Japanese art as Maruyamma, Hiroshige and Hokusia.

AZTEC POTTERY DESIGN

Showing the abstract treatment of bird forms frequently found in designs of the early Indians

A mythological story is told of old Japan wherein one of these esteemed artists was called before the Emperor to demonstrate his skill. Sketch after sketch was made according to the will of the ruler until he finally asked for a drawing of a dragon. With such gusto did the artist paint and of such life-like appearance was the monster that fire belched forth from its nostrils and the drawing was consumed in flames.

From the Asiatic countries have been coming, for many hundreds of years, native rugs embellished with all the glories and mysteries of Nature. I saw one recently that contained several hundred dogs within its design, yet not one was readily apparent to the casual observer. These remarkable designs without marked repetition and with

INSPIRED BY THE LAPPING WAVES

The Greeks took them as an inspiration and evolved this highly decorative form of design from them

their delightful use of abstract forms of Nature have made Oriental rugs famous throughout the world.

Coming back to the Western Hemisphere we find the early civilizations making use of bird and animal forms in the design of their temples, their weapons, their pottery and their clothing. Perhaps the most exotic example we have of primitive American decorative art is the work of the Aztecs—a race that was old before the discovery of America. From this Central American race come relics showing the adept use of bird, animal and flower forms in a distinctly different style. Some of the motifs are produced in such abstract form that they are barely traceable to the original. The example shown is taken from a fragment of pottery and shows the trend toward reproducing Nature in a most abstract form.

THE TOUCAN LENDS ITSELF TO DESIGN

A trip to the zoo inspired this confection, which is colorful when done in full tints

Closely allied to the art of this Central American race is the art of our own North American Indian. We are all familiar with the brilliant rugs, pottery and costumes of these people. In the ornament of these articles we find motifs that were, undoubtedly, at one time true forms of Nature but have become so conventionalized in being passed down through the years that they are hardly recognizable as such. Symbols of their belief in the Great Beyond are favorite devices—such as the ever-present design of the sun. The horses and buffalo have also been utilized as design motifs and other natural forms have served as inspiration for their varied costume.

Today, as in the time of this earlier civilization, Nature continues to serve as the one great inspiration for all manner of design. A peculiar evening glow over a mountain lake will suggest a color scheme to a manufacturer of motor-cars or a butterfly upon a sprig of phlox will send a designer of cretonne into spasms of joy!

And what a chance we have of exploiting Nature today! The Alexandrian artist of a thousand years ago had to be satisfied with carving his ideas upon stone or metal or at most painting them direct on a limited surface. With the possibilities that this era of advanced knowledge has brought us, we have almost unlimited means of not only reproducing our own ideas, but of distributing them throughout the world. The invention of the camera and the various reproduction processes gives us the privilege of producing not only one of each design but as many as we choose. This ease of manufacture has meant an increase in production and necessarily a demand for fresh ideas. Nature continues to supply them just as willingly as she supplied the meagre wants of the craftsmen of the earlier days of our civilization.

The designs used by the manufacturers of today cover a wide range. A wall-paper design may be a strikingly realistic or an abstract display. A printed fabric used as a chair covering may be a vivid reproduction of realistic flowers or a formal pattern of the same flowers wrought in a conventional manner. In many instances we have delved into the history of design and have been influenced by some special mannerism practiced by the fore-runners in this field. For instance, the design for a decorative fabric might, in its elaborate detail, suggest the exquisiteness of the early Chinese craftsmen, or again, the broad application of a flower motif. might recall the purely abstract style of a Mayan

FOR A MODERN WALL-PAPER
Flowers arranged in a somewhat realistic fashion for the wall

designer or the Navajo weaver of rugs.

A trip to the Washington Zoo formed the inspiration for the fabric design containing the toucans and foliage. The iridescence of a butterfly's wing has been the foundation for a color scheme for many utilitarian articles in the home and the pattern formed by lilies in a pool of green water has been transferred to many a strip of soft hued wall-paper.

In like manner have the beauties of Nature been utilized in the field of commercial advertising. In this business of carefully phrased sales messages it has been found that a charming subject lifted from the lap of Mother Nature and presented to the reader on the page of a magazine often has more appeal and attracts the attention of the buyer in less time than a similar page full of carefully compounded words. The flight of birds has been presented to suggest the swiftness of a certain manufacturer's product and the strong silent quality of another bit of merchandise has been strikingly illustrated by an artist's conception of a tigress stealing through the jungle. The possibilities are many.

It is perhaps only natural that we should surround ourselves with this particular array of Nature in our homes since our present age has seen a marked advance in education and advertising—especially the advertising that has been selling us the Great Outdoors. We are constantly being told that the rays of the sun hold for us the cure of our physical ills and that the clean fresh air of Nature's playground will sweep the cobwebs from tired over-worked brains. It is the doctrine of the century and it is making the world "Nature-conscious." Little wonder then that our homes are more colorful by way of decorative material than they were a decade ago.

But even surrounded as we are with these reminders of the outdoors I wonder if we realize the full significance of the kinship between design and Nature.

As we relentlessly draw upon her for new ideas we are reminded that she is of an illimitable quantity and proof against any demands of the modern world. Most certainly the future of design rests safely in her hands.

ANOTHER MODERN WALL-PAPER
Here, again, flowers serve although the treatment is much more abstract

HE SHOOTS THE SUN

WILLIAM HENRY, NEWSPAPER PHOTOGRAPHER

WITH AN ASTRONOMICAL HOBBY

BY LUCIEN ZACHAROFF

Being the eighth of the series of articles dealing with the Nature hobbies of prominent individuals

SUN-WORSHIPPER
Daily William Henry photographs old Sol

AMATEUR astronomy is generally believed to be a night hobby. The case of William Henry, however, tends to contradict this theory. For of all the celestial objects the sun commands his greatest interest. And the ancient science is mighty fortunate in having Mr. Henry to pursue his hobby in daytime. He specializes in solar photography, with results that compel both the respect and the admiration of the scientific world. At Vassar College, for instance, his photographs are used to illustrate to students the manner of the sun's rotation. Harlow Shapley and Clyde Fisher are among the leading astronomers who consider Mr. Henry's pictures of inestimable value for those engaged in the study of the sun.

RECORDING THE SUNSPOTS
Mr. Henry allows nothing that goes on in the sun to escape his attention

For nineteen years Mr. Henry worked as a photographer on the old *New York Herald,* at one time heading the paper's "art" department. Upon the death of the senior Bennett he went into a business for himself. He was educated in his native Scotland and was brought here at the age of fourteen. Art—drawing from life—was one of his earlier passions. He cultivated his interest in it by taking courses at the Pratt Institute and the Y. M. C. A. He has made hundreds of drawings of Mars.

As a newspaper photographer, Mr. Henry has been called upon to "shoot" multitudes of notables, including a goodly number of Presidents—Roosevelt, Cleveland, Taft, McKinley. In 1900, during the total eclipse of the sun which was visible in some of the southern states, he was commissioned by the *New York Journal* to point his camera skyward, and from the time of that event dates Mr. Henry's enthusiasm for things astronomical. When he arrived in the South to fulfill his assignment, he met a number of distinguished astronomers who came to make their observations of the eclipse, among them the late Professor E. E. Barnard of Yerkes Observatory, whom Mr. Henry considered "the greatest celestial photographer." Barnard on many occasions had voiced his admiration of Mr. Henry's contributions to the photography of the skies.

To indicate how exhaustive are the photographic studies of this modern sun-worshipper, it may be mentioned that from 1914 to 1919 he made a daily camera record of the sun, departing from the practice only when weather conditions made the task impossible.

As a commercial photographer, he specializes in taking pictures of real estate developments.

In addition to having his pictures published in scientific mediums, rotogravure sections of newspapers make a wide use of them. He also contributes articles to astronomical journals. Mr. Henry's other hobbies include botany, geology, and volcanoes. Incidentally, during his newspaper career he had several assignments in connection with eruptions in various parts of the world. He is still single but willing, resides in Brooklyn, maintains a studio in Manhattan, and has two telescopes, a five-inch Clark instrument and an eight-inch Mellish reflector.

SUNSPOT DISPLAY
Photographed by Mr. Henry in December, 1929, during a period of maximum sunspot activity

omers in a leisurely fashion, but without the benefit of the camera they were unable to see those celestial wanderers. Mars holds an unusual interest for Mr. Henry, and in 1924, 1926, 1928, and 1930, the years when that planet was the nearest to Earth, he made hundreds of drawings of it, with the aid of his five-inch telescope.

He has been making a special study of the connection between the sunspots and aurora borealis, and, believe it or not, photographed the latter in the wilds of New York City in 1914 and 1919. In the last-named year he obtained an unusual photograph of aurora borealis and after developing it in a hurry, left it in the office of the city editor of a newspaper that he was working for, with a note to the effect that the picture was a "scoop." The next day no paper published a photograph of aurora borealis, and when Mr. Henry went to see the editor and questioned him on his failure to use the exclusive contribution, that dignitary replied indifferently: "There was not enough action in it."

Shooting stars have (Continued on page 320)

And Mr. Henry's friends can be encountered in every quarter of the globe. He is a member of many organizations, a number of which are scientific societies and associations of astronomers.

Of his affiliations the one of which Mr. Henry is particularly proud is his secretaryship of the department of astronomy of the Brooklyn Institute of Arts and Sciences. Twice a month the department's telescopes are taken out on the roof of the Academy of Music where the Institute is housed, and sometimes as many as 150 fascinated Brooklynites get an opportunity to view the parade of the double stars, the moon and the planets, and to hear Mr. Henry's explanations of the various heavenly bodies. He is also a member of the council of the Amateur Astronomers Association, at the American Museum of Natural History, which came into worldwide prominence when it announced a free showing of a film explaining the Einstein theory of relativity, the announcement leading to a public stampede that proved a bit too much for the museum attendants. The event was repeatedly referred to in the press as the "Einstein riot."

Time and again Mr. Henry's photographic plates revealed the presence of comets in sections of the heavens that were scanned by other amateur astron-

AURORA BOREALIS AT 36TH AND BROADWAY
A photograph as interesting to the New York urbanite as to the astronomer. It was taken in 1914

THE PELICAN FLOWER

STRANGE TROPICAL GROWTH IS INTERESTING BUT ODOROUS

BY DOROTHY E. PLETCHER

CURIOUS indeed is the pelican flower, one of the largest in the plant kingdom. So strikingly does it resemble a bird in head, bill, neck and body that one involuntarily glances a second time to make certain that he is truly looking at a flower and not a bird. At first the plant makes one think of a large morning glory vine. The flowers, hanging pendant in various stages of growth, form one of the most remarkable sights in the realm of botanical wonders. In size, no other bloom can equal this flower, which, if the tail-like continuation of the corolla is included, is nearly five feet long. The average pelican flower is as large as a good sized duck.

Before coming into full bloom, the large flower is green and its edges are fastened together in the manner of the small blooms on a balloon vine. The main vine runs parallel to the ground for great distances; the stems to which the flowers are attached grow out from the main vine at various intervals in the nature of offshoots, and attain a length of several feet.

It is the side view of this flower that gives the impression of a pelican with neck bent and head resting on its breast; the eyes and beak are easily discernible. The general color is creamy white, with large heavy veins of purple from which run a series of smaller veins, thus giving the whole surface the appearance of parchment lined with a purple pencil. The interior of the flower resembles purple velvet, so smooth is it, and the inside of the throat is lined with hairs turned downward, apparently for the purpose of preventing the return of the insects caught inside. Its leaves are large and fan-shaped.

More than a century ago a botanist came upon the pelican flower in the West Indies and published a description of it. Another man, in writing of its character and odor, said "the plant is so abominably fetid that it is detested and shunned by most animals; yet when hogs venture by necessity to eat of it, it destroys them." Other writers as well call attention to the fact that herds of swine have perished from eating the roots and young stems of this plant. Yet this plant is peculiarly intriguing to insects that perform the process of pollination of the flower. The insects rush into the corolla tube where they come upon a series of stiff hairs which serve to prevent their escape and hold them within the flower. It is claimed that the flower is gracious enough to provide for the insects during their imprisonment, which frequently lasts several days; when the stamens have ripened, a shower of pollen falls upon the tiny prisoners, at which time the area of hairs gives them up and they fly away to perform their part in pollination elsewhere.

THE BIRD-LIKE FLOWER

Not only is this bloom the largest of all, but viewed from the side, resembles the bird for which it is named.

The rather formidable name of the family to which the pelican flower belongs is *Aristolochiaceae*, this particular species being called *Aristolochia grandiflora*. It is rather commonly found in tropical America, the best known places of its nativity being the West Indies and Central and South America, where it thrives along the banks of streams, for the most part in low, moist localities.

Some of the species of the family are inodorous, and these are rather commonly cultivated. *A. grandiflora* may be found occasionally in some greenhouse in the United States, being grown under glass, although its size and offensive odor prevent its acquiring extensive popularity. For curious shape and interesting habits, however, it attracts attention wherever one may chance upon it.

TREES IN COURT

EVALUATING FOREST BEAUTIES AT THE BAR OF JUSTICE

BY MAURICE L. CONDON

TREES, to the majority of people in an older generation, at least, used to be just things that grew outside, usually somewhat in the way. They arrived with other joys and sorrows of the human race from Mr. Adam's garden, and one of them—the apple—supplied the stimulus for a lot of trouble in the extensive estate of Mr. Adam many years ago. Perhaps a large number of public utility companies running cross-country power lines and busses along shady streets believe that trees were designed for their particular torment.

Although lovers of the outdoors, trees occasionally wander into court. Goodman sues the X Electric Light and Power Company for carving his favorite oak while adjusting wire clearance so that it looked like a Pomeranian clipped to resemble a lion. John Doe accuses his tenant, Richard Roe, of chopping down his cherry trees and wants triple damages for commissive waste. Occasionally a tree comes to the bar of justice in its own right, as did one in Georgia to which was deeded, in fee simple, by one William H. Jackson, party of the first part, itself and eight feet of the surrounding landscape.

While trees do not form a particular branch of the law, certain principles are limned out in dealing with them. They are real property as long as standing. If cut down, they become personal property. If, in the days of the old common law, A chopped down a tree on B's land, and carried it away immediately, he could not be held guilty of larceny, but only of trespass, on the theory that no one can steal real estate; but if A had cut it on Tuesday and came back for it Wednesday, he would be as larcenous as Robin Hood, or a pack-rat, in any court.

What bothers judges and juries most of the time when trees are before them is the question of value. Shall they go on the "original cost" or "reproduction" theories? How much shall they assess as heart-balm to the tearful owner who hales a company or individual into court for ruining the south-east exposure of the old maple in which he used to play Chief Tough Bread and the Cowboy at the age of eight? Shall they be guided only by the lumber value (X board feet times X dollars per thousand), or shall they write new ideas into the law of damages, as courts are doing in billboard cases, by evaluating injury to the aesthetic and outrage to

THE BURGOYNE OAK AT AMAWALK, NEW YORK
This tree, estimated to be three centuries old, has a historical value because of its association with the Revolution. It has a spread of about one hundred and twenty-five feet and sits on a hill overlooking the surrounding country

A YOUNGER GENERATION COMES ALONG

Beneath this ancient monarch, young trees start on their way to be beautiful ornaments on the landscape

legitimate sentimentality due to a nascent civilization?

One of the highest values ever placed in a court of law on a tree was $3,000, and perhaps the public utility company that paid so highly doesn't think as much of Joyce Kilmer's poem as the rest of us do. The expensive hemlock stood on a lot which had sold previously for $2,000, and had originally twenty-five or thirty sisters, some of which had been cut down by the owner for building space and the rest turned out to pasture to shift for themselves. Then entered the villain of the piece, the p. u. co., which removed a number of limbs from the hemlock, by permission. The owner, however, didn't like the trimmings on the tree and set out to give the company another at the bar of justice.

The owner was the star witness for the plaintiff. He sobbed bitterly over the *corpus* not yet *delicti*. He claimed this was his favorite of all trees, that his home had been ruined by its loss of branches, that he had purchased the property only because of said tree, and that the old place would never be the same. He intimated that he would have preferred to drink the hemlock to having it hurt. The jury went out and assessed the damage at so much a tear. Their donation of a $3,000 sponge was tremendously effective. And the hemlock could have been replaced for one thousand dollars, at least.

The p. u. companies then went into executive session, decided to employ experts in tree surgery to give them wire clearance without such shocks to the treasury; and tree-lovers really benefited from the expensive lesson. Of course, occasionally "hoodlums," —as was done in the Nation's Capital several years ago on Sixteenth Street—go on a rampage and the trees are discovered in the next dawn's early light to have been butchered while the city slept.

All tree values, aside from the commercial, fruit or lumber values, are formed on the basis of sentimental, aesthetic or historical interest, and each of these three factors is as full of pitfalls for a court as the Sahara is of sand. Fruit trees will naturally be valued according to their crop yield, while shade and commercial trees generally have a firewood or lumber value. It is when they get amid the Washington Elms and the Pinckney Oaks and the Lonesome Pines that juries get circles under their eyes.

I know a fine row of beautiful old elms stretching along a highway in front of two homesteads. The trees were planted prior to the Revolution, and have attained perfect size and beauty. In one home lives a carefree soul dominated by the doctrine of *laissez-faire*. Trees, to him, are fixtures of Nature and the Lord's will be done. When one of the elms was split by a wind storm, he paid no attention to it, although a bolt costing a few dollars would have saved the beauty and usefulness of the old giant. If elms were good firewood, he doubtless would have cut them down long ago.

Further down the road lives another who loves and and cares for his trees. He keeps them in excellent condition, and guards them jealously as beautiful, graceful adornments that enhance the value of his property.

Now if a gas main were to break and trees on each property were to be killed—for trees can be gassed as well as soldiers—would all the trees be valued the same? Would the gentleman who improved on Nature receive the same stipend as the gentleman who considered not the morrow and let Nature take its course?

There is an apple tree in New England that I knew as Jim Perry's tree. All the children with whom I played as a boy had special seats in it, and the bark was worn smooth by the climbing knees and legs that shinnied up it. We loved that tree because it represented to us many hours of our happy childhood. We saw it bloom in the

spring and watched its fruit ripen in the fall. We saw the leaves drop as winter drew on and gazed with interest at the lacy network made by the naked boughs etched on the sky. It was an integral part of our youth. And there is not one of the old gang, now scattered over the world, that wouldn't contribute to its preservation. But how much would a judge and jury assess against one who failed to harken to the poem, "Oh, woodman, spare that tree?" Yet no money could compensate for its loss to us.

I remember an old tree on the property of the Amawalk Galleries when the latter were first established some five or six years ago. It was an apple that had grown in the middle of a pig sty. Broken down farm utensils then were piled around it. The quality of its fruit never inspired a poet's muse but the gracious symmetry of its wide-spreading branches might have.

The spot where pigs once wallowed is now a part of an attractive country gathering place, landscaped and gardened. Umbrella tables and comfortable chairs surround the apple tree. Garden clubs meet in its shade. Today it couldn't be bought for $5,000. Six years ago a five-spot offer would have seemed a generous price for it.

Environment can enhance the beauty and dignity both of a tree and of a person. Near this old apple tree are tall, stately old locusts on which cattle were once wont to scratch their necks in summer. When the terrace of the galleries was planned, the venerable gentlemen of the forest were properly drained and cared for and flagstones laid in circles about them. They are still the same old locusts; but today they are aristocrats instead of diamonds in the rough. No money on earth or Mars could buy them now. If they ever came into court, it would require a clever jury properly to evaluate them.

A few years ago I was asked to get a sugar maple tree for an owner of a country estate at Greenwich, Connecticut. He knew what he wanted, and we searched for days on days until we came across a magnificent specimen sixty feet high and in perfect form. The farmer who owned the property nearly fell over himself to consummate the deal when we offered him seventy-five dollars for it. He wanted to get the money before we recovered consciousness.

The tree was transplanted to the Greenwich estate at a cost of several hundred dollars and grew so beautifully that the new owner admitted he wouldn't take ten thousand dollars for it. In fact, he demanded another as near like it as possible. So I went back to the farmer for the second maple.

The old colored woman who did the family wash protested:

"If you-all keep a-movin' them trees away fum yere, I won't have nuthin' left to tie my clothes line to," she fumed.

So we got her clothes posts, and she felt that she gained by the transaction. The farmer was happy with his seventy-five dollars and the Greenwich estate owner mentally entered a profit of $9,925, less cost of moving. That tree made money for everybody.

There are hundreds of historical trees in the country, and their value is always a source of trouble to a court and jury. The old Continental Oak at Bedford, New York, with its splendid spread of approximately one hundred and twenty-five feet, is a Revolutionary War tree known to the entire nation. But only a short distance away, standing back in a pasture, is a tree fully as beautiful and just as old, but only the farmer who owns it and the cows that rest in its shade know about it. It has no historical value.

The famous Endicott Pear Tree of Danvers, Massachusetts, was planted by Governor Endicott before the Revolutionary War. I have a vivid recollection of my eagerness, as a small boy, to eat one of the hard, scrubby little pears that fruited there. I guess they must have absorbed some of the Puritan hardness, crabbedness and joylessness, for they were about as unappetizing as a

A TREE WHOSE WORTH IS HISTORICAL

It is the Continental Oak at Bedford, New York, under which rested American troops during the Revolution. It is about four hundred years old, and about one hundred feet high with a spread of one hundred and fifty feet

THIS TREE'S VALUE JUMPED FROM FIVE TO FIVE THOUSAND DOLLARS

Once it stood, a neglected apple-bearer, in the middle of a pig-pen, and had little worth. Now the surrounding grounds have been landscaped, and it is a favorite shade tree under which gather garden clubs and tree lovers

pair of riding boots, but I thought they were great, and an orchard of exceptionally fine Bartlett pears across a fence from the Endicott planting was saved from a raid. If a court had to decide, which would be held more valuable—the Puritan-planted tree, or the Bartlett-bearers? It would have no trouble in arriving at a value for a fruit tree—original cost plus annual yield plus the sum for pruning, care and fertilising. But the sentimental value of the Endicott tree would upset the most shrewd calculations of the experts.

Out in Sequoia National Park is the oldest tree in the world—the General Sherman Sequoia. Lumbermen wouldn't riot to get it, but if it were destroyed, thousands of visitors would mourn its loss sincerely, for it has an individuality of its own and a place in the national esteem.

Of all the famous historical trees in this country, the George Washington tree at White Plains, New York, is one of the most outstanding. It is a sycamore that antedates the Revolution and is known to the world because Washington always tied his horse to it when he was at headquarters. It seems that when Washington wasn't surveying all the land in Virginia and sleeping in every farmhouse along the Atlantic seaboard, he was either planting trees or tying his horses to them; but he probably tied his horses to this sycamore considerably more than to most trees.

The old tree is in the stage when, if human, it would say, "I knew him when . . ." It is likely to be hollow on the inside, and not worth a Continental intrinsically. Yet thousands of tourists speak reverently of it as the Washington Sycamore, and completely ignore another sycamore a mile down the lane that is in a far better state of preservation.

It is true that the famous Washington boxwood, planted by the General himself in 1761 at Hayfield, Virginia—near the only house ever built by him—was going to ruin uncared for a few years ago. Cows and mules were roaming about this once beautiful garden, planned and cared for with artistic devotion by Washington himself. It was eventually purchased by Evelyn W. Smith, who has devoted her entire life to the study of trees. Miss Smith transplanted the Washington boxwood garden to her

TREE-PLANTING BOOK FOR YOU

Write to Charles Lathrop Pack, President of The American Tree Association, 1214 Sixteenth Street, Washington, D. C. and ask for a tree-planting book. Make your plans to plant a tree in memory of George Washington. Nature Magazine has arranged for you to get the tree-planting suggestions at once. Your name will go on the Association's national honor roll when you have planted your trees. Get others to plant and by all means report the number of trees planted to the American Tree Association.

estate at Amawalk, New York, where it was formally dedicated to the memory of her father, Major Orlando Jay Smith, founder of the American Press Association and a friend of the trees. Here the boxwood has become a rarity that any judge would appreciate. It has even a greater value than another piece of boxwood which was purchased originally for ten dollars and transplanted to the garden of a nationally-known estate. I happen to know that an offer of four thousand dollars has been refused for it and this ancient box now brings an assessment of ten thousand dollars.

What would you say is the value of the trees George Washington planted at Fredericksburg? One of them is still standing. What value will be placed upon the thousands of trees being planted this year and next to mark the bicentennial in 1932 of the birth of the first president? Who can figure the value in dollars and cents in 2032 of those living memorials? Thousands are planting these bicentennial trees. Are you on the national honor roll of the American Tree Association at Washington? This bicentennial tree planting takes many forms such as Roads of Remembrance, Memorial avenues, town forests and school trees.

Justice, incidentally, is a lot less blind in these days than formerly when figuring the value of trees that come in court. It considers their location—whether in slum or park, on highway or country road. It estimates as best it can the expenses of their care, their ornamental value and their intrinsic worth to the property on which they stand. And, of late years, it is estimating as of considerable moment their historical and sentimental worth to the nation or to the individual. In Hemlock v. Public Utility or Mayflower Oak v. John Doe, Axman, it is not only the defendant's attorney that is eloquent; often the spreading branches, the cool shade and gentle symmetry have their plea before the bar—a plea that often results in a transfer of green from the depredator to the owner whose still more beautiful green has been illegally destroyed.

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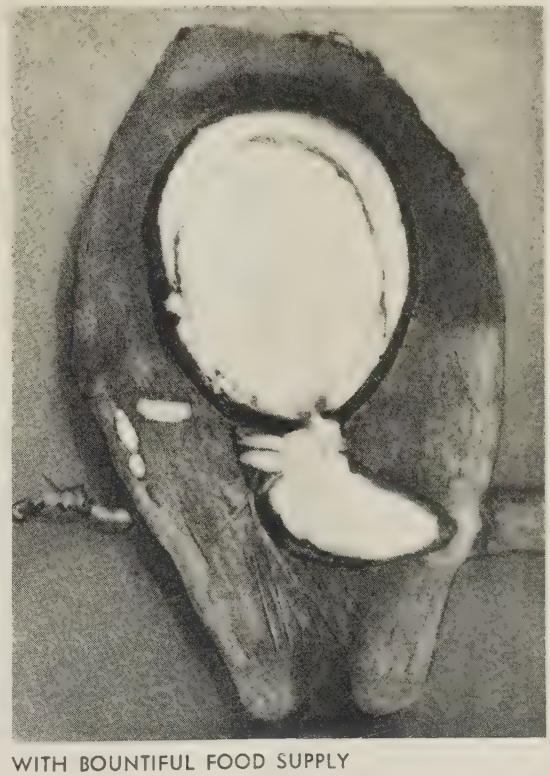
PREPARED FOR LIFE

COCONUT IDEALLY FITTED TO SURVIVE

BY SAMUEL FALES

• • •



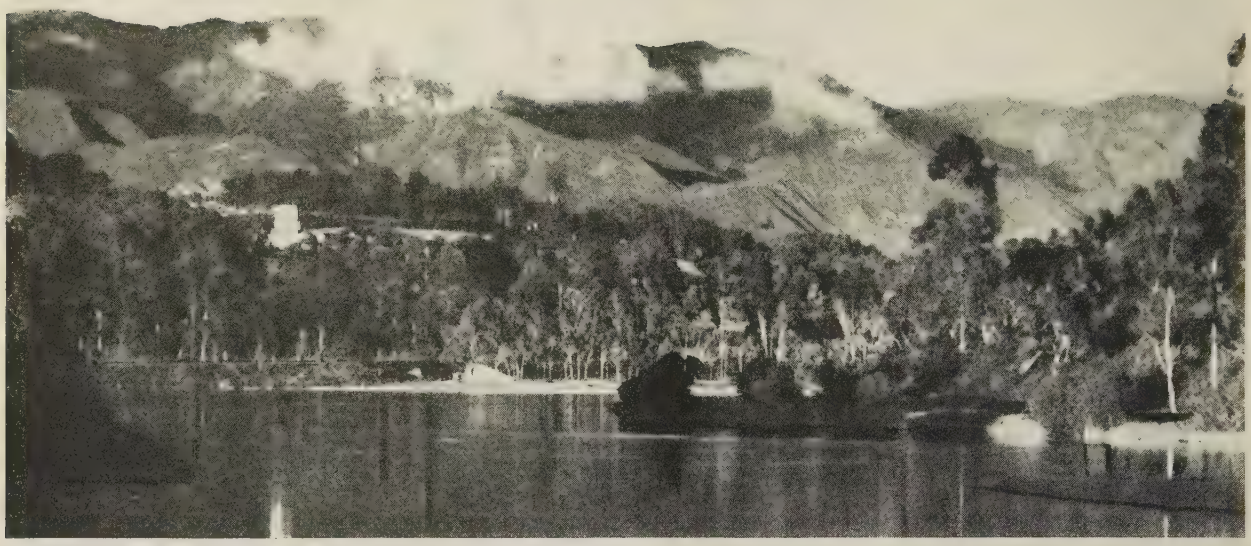
WITH BOUNTIFUL FOOD SUPPLY

A cross section of the coconut showing the outer husk, the hard shell, the meat and the central pith. The upshoot at the right is the young plant itself

How many realize that the shredded coconut meat that forms the topping to so many delicious cakes is far more important to the tree on which it grows than to the housewife it serves so well—that it is an essential factor in the growth of the coconut into the new plant?

The accompanying picture shows a coconut, neatly bisected to reveal its formation after the germinating process has set in. About the whole is the tough husk, especially hard around the nut itself, and softer at the end where the first shoots are pushed out from the embryo within. Surrounded by the husk is the hard shell, and inside of that is the meat with which we are so familiar. This meat, which noticeably decreases in bulk towards the hilum, or hole through which the shoots have sprung, is a main source of food for the young plant. The oval white area in the very center is a dense pith-like substance of a decided starch composition. It, too, is perhaps a nutrient. It is interesting to note that this pith substance is present in the cavity once filled by the coconut milk. In all probability its transformation was caused by a purely chemical process.

The presence of the protective husk, the hard inner shell and the large food supply makes it easy to understand how the coconut can cling so tenaciously to life. The coconut palm has distributed itself throughout many outlying islands in southern oceans by the gigantic seed drifting along in the water till it was cast ashore in some spot where it took root and grew. Indeed, that is how these trees came to Florida. Its self-nutrition is another reason for its great preservative properties; the young plant has the capacity to exist for six months on practically its own resources. Examples fully illustrating Nature's plan of thorough self-nutrition are the large numbers of coconuts actually found thriving on the sand three or four feet over high-water mark. The coconut is ideally fitted in its fight for existence and its continued spread proves its efficient self-management.



WHERE THE BIRDS FIND PEACE AND FOOD IN CALIFORNIA'S HILLS

The idea of the sanctuary was gained from wildings driven by storm inland from the sea. Mrs. W. A. Clark gave $50,000 to carry out the project

SANTA BARBARA BIRD REFUGE

NINETY VARIETIES HAVE SOUGHT REFUGE WITHIN ITS BOUNDS

IN 1906, sixty farsighted citizens of Santa Barbara, by public subscription, bought a parcel of land between the mountains and the sea for a park system. Someone, noting how the birds driven in by ocean storms instinctively sought refuge here, conceived the idea of a bird sanctuary.

A gift of $50,000 from Mrs. W. A. Clark, widow of the late Senator Clark, has been the means of making the place—now known as the Andree Clark Bird Refuge—a place of greater interest and beauty than ever before.

In the beginning the land was a large marsh. This has been flooded and is now a clear lake, bordered with trees, shrubs, footpaths and motor drives. Dotted about the water are miniature islands.

H. P. MOSELEY

GULLS AT SANTA BARBARA

At least ninety different species have visited the refuge, among them many rare birds

Early in September fleets of dainty phalaropes took possession. Soon after appeared pintail ducks, gulls and killdeer plover. During the winter months the refuge was crowded with bird life.

Bird lovers of Santa Barbara who have for years kept a record of the birds which have visited the Refuge estimate that over ninety species, with water birds predominating, have sought shelter here. The list records seven species of grebes and loons, twelve of gulls and terns, fifteen kinds of ducks, seven of the heron tribe and twenty-two shore birds. Included are such interesting birds as the ring-necked duck, snowy egret, pectoral sandpiper, and the lesser yellow-legs. One fall two immature Eastern kingbirds, the first ever reported in Santa Barbara County, and only three times before in the state, visited the sanctuary. We wish that more such areas could be established throughout our land, to give sanctuary to the persecuted because they are sorely in need of them.

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NO LACK OF COMFORT HERE

Your summer porch can become the gayest winter room in the house by glassing it in, heating it, and attractively decorating it to match the outside view and house wall. And the expense may be low

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THE ALL-YEAR SUNROOM

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BY ESTELLE H. RIES

THE open porch that for at least half the year provides such joy and comfort to the family need not be forsaken now that winter is at hand. The addition of side sashes of glass, and the introduction of heat, convert it to an all-year solarium, a place of glowing sun when it is most wanted; of plants and flowers and gay color when these are scarce in Nature and therefore doubly appreciated.

Heating the sunroom is not as difficult as might be imagined, if the room is properly built; and in view of its popularity, the expense is justified. With the aid of double sash on the side most exposed, of the sun shining on the glass by day, and heavy curtains drawn at night, the problem is not so serious as might be thought.

The solarium is one place where severity is not welcomed in the furnishings. Probably because the cold wintry scene is in constant evidence, the contrast of warmth and physical comfort is demanded. So much glass requires the cheering influence of color and ease to balance its bleakness and rigidity. Where the outlook is unattractive, or restricted, rural scenes may be painted on the walls, or gay patterns of such wall fabrics as Sanitas may be employed. Gay draperies, too, will do their part to counteract the effect of the unsatisfactory view. If, however, the windows overlook an interesting vista, whether of gardens, woods, lawn, or water, a simpler scheme is possible for the solarium. The windows then may frame a picture painted by Nature, and should

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not attempt to vie with it. Sometimes, then, over-draperies may be dispensed with, and instead perhaps soft French shades that fold up in festoons and serve to diffuse the light will be best. If cretonne, glazed chintz, hand-blocked linen, or other popular over-draperies are had, some sheer glass curtain fabric should be used with them. Such materials as theatrical gauze, voile, scrim and net commend themselves.

Sometimes instead of using over-draperies, an interesting effect is obtained by painting the wall a soft color, and decorating the lunettes over doors and windows with gay designs of flowers, birds and fruits. Fluted pilasters, hand-carved cornices and capitals that are seen in the more costly solariums may appear in less pretentious places by the use of a classic wallpaper in the design of which such architectural features occur.

But the colors are probably the most interesting part of furnishing the solarium. We are intrigued by the possibilities of periwinkle, peach and pale green, of blue-violet, green and yellow; of rose, blue, green and mauve; of gray, blue-green, black and orange, and of many other delightful combinations. We can picture one, the white woodwork of which sets off walls of Chinese floral paper in blue, rose, mauve and green on a white ground. A deep mauve rug covers the dull green floor. Mauve sunfast gauze forms the glass curtains, and the over-draperies are of mauve and green changeable taffeta or sunfast. Apple-green enamel furniture is striped with mauve. Sconces in the form of flower baskets, with rose shields and rose candlesticks, are among the charming accessories.

Or again, in another sunroom the walls are gray, the woodwork a blue-green. The floor is covered with linoleum in wide blocks of gray and blue-green. Over-draperies are cretonne in blue-green, orange and yellow on a black background. Glass curtains are in natural pongee. Black enameled wicker, cushioned with cretonne like the over-draperies, is chosen for the main pieces of furniture. Wrought-iron lighting fixtures with orange shades or candles give a finishing touch, and of course plants are in profusion.

The color in the scheme which seems to have the most weight should predominate in the rug, and while the sunroom in summer does not require a rug, in winter it achieves a sense of warmth by this means. Weather-stripping along the windows and doors is an additional aid in this direction. Two-toned velvet rugs, small hook rugs, braided rugs, rag rugs, and even oriental effects may be acceptable if chosen to accord with the other furnishings, and are better for winter than the

HANDSOME

A more formal treatment of the sunroom, with printed linen curtains of Italian design, a dark note in the furniture, and a marble center table

COLORFUL

A sun-dining room, brilliant with many plants, will add zest to meal-time. The rug, you will notice, strikes the key-note of the furnishings

grass, linen and other warm-weather types. The cushion material that in the warmer months may be of almost any summery thing from gingham to oilcloth may also give way to something richer and darker. Bits of brass, copper, and warm yellow glazes are apt to suggest the sun on cloudy days and add warmth and beauty to the general impression.

In furnishing the sunporch, one must be largely guided by the architecture of the house and the material of which it is built. Since three of the sides are generally glass, there is usually but one important wall and this will be of whatever material the house is built—wood, stone, brick or stucco. While this wall is frequently and successfully left as it is, it is also possible to cover this surface with lattice, under which deep boxes of soil give a root-hold for vines. These various wall finishes influence the scale and detail of the furniture to be used. Thus a wooden wall would call for the wicker and painted types, while something heavier, such as iron, could be supported by the brick or stucco. To be sure, iron need not be used exclusively if it is felt to be less flexible or less comfortable than the others, nor, if a note of formality is wanted, need it be entirely omitted from the more intimate porch.

Until quite recently, in America anyway, iron was more or less ignored as a furniture material. But with the influx of old Italian and Spanish iron work brought by antique dealers and collectors, its possibilities were made known. Ironware is especially suitable in houses of stucco, or otherwise suggestive of Spanish, Italian or other south European tradition. Today we have available many beautiful designs of iron floor and table lamps, iron flower stands, iron wall brackets, iron console tables, mirror frames and other accessories. While these things are somewhat overweight for a simple porch with wooden walls, they have a decided dignity in stronger surroundings, as in the presence of brick, stucco and the like. Even an occasional piece in the wicker or painted porch furniture adds interest and distinction.

When the background of the solarium has been planned conservatively there is nothing to prevent choosing the gayest of the gayly painted woven furniture. While it may sound daring to talk of vermilion, orange, and other very bright colors, yet in a room sufficiently large, and against a suitable background, they are of great interest. If, on the contrary, the background of the room has plenty of color and pattern, it is preferable to use "natural" colored furniture, or something relatively quiet.

There was a time when chairs were the only pieces obtainable in the wicker types of furniture, but today we may find almost any pieces we may require. Comfortable couches, settees, deep lounging chairs, chaise longues, tables large and small, tea carts, magazine racks, fern stands and lamps for both table and floor are but a few of the pieces available for comfort. When bamboo and

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WHERE THE FAMILY GATHERS

The sun-reading room, done in light colors and comfortably furnished, will never lack for occupants if as tastefully arranged as this room

rattan furniture is used, the accessories may exploit other Chinese tendencies. Lamp shades of silk or bamboo with tassels, or better yet, genuine dragon lamp shades go well. There are also real imported rice paper lanterns to fit over the electric light bulbs and to modify the glare into the softer light which is so much more agreeable.

While wrought iron is a very formal type of furnishing, wicker is the least so, and painted pieces take a place about midway between, and therefore combine admirably with both. These too may be as colorful as you like, or rather as colorful as the background will stand. Furniture of jade, canary, or peacock blue, combined with black, ivory, gray, rose or other suitable tones, are all acceptable. Chairs of brilliantly colored leather often form the note of contrast in the wicker-furnished room. Simple quaint pieces in maple have a cheerful, perennially youthful aspect in a solarium and commend themselves for many places for variety.

To make the sunroom the happy place it wants to be, it is necessary to observe those same ideals of careful planning that we confer upon the official living room. If the whole family is to find it agreeable, each member should be provided for in the equipment. Just as within the house, the furniture should be arranged logically about an important piece of furniture or center of interest. Sometimes a small table, or a swing, or a chaise longue will dominate, but whatever it is, let there be a cosy informality and livableness about the arrangement. It should be cosier than the living room, more intimate, more softly shaded and furnished less formally. When the living room and solarium are inter-connected, it is often desirable to let one melt into the other gradually in color scheme and avoid too sudden a change of character. Since the living room is generally nearer the entrance hall, and certainly more formal, some of the furnishings that suggest the more intimate interests of the family could be moved to the solarium, a change that does not entail much effort and that will be refreshing for a few months. When we consider the elaborate pains taken in medical centers both here and abroad to take advantage of the beneficial influence of sunlight, it would seem that a solarium should be allowed to do its full duty. Thus a desk, reading table, work basket, even a phonograph or radio, might assemble here for the winter while the users may bask in the health-giving sunshine.

Of course this means that it must be possible to light the place adequately at night, so that these furnishings may be used whenever necessary. Ample wiring also makes it possible to have informal meals electrically prepared right on the scene. Table devices, heating devices, and other electrical equipment, made available by sufficient outlets, will enable the room to be comfortably used for many additional purposes, day and night.

The sunroom does not really begin to fulfill its possibilities unless some kind of plant (Continued on page 320)

THE WAVES CALLED TIDAL

SPECTACULAR MOUNTAINS OF WATER THAT BRING TRAGEDY TO MAN

BY CHARLES FITZHUGH TALMAN

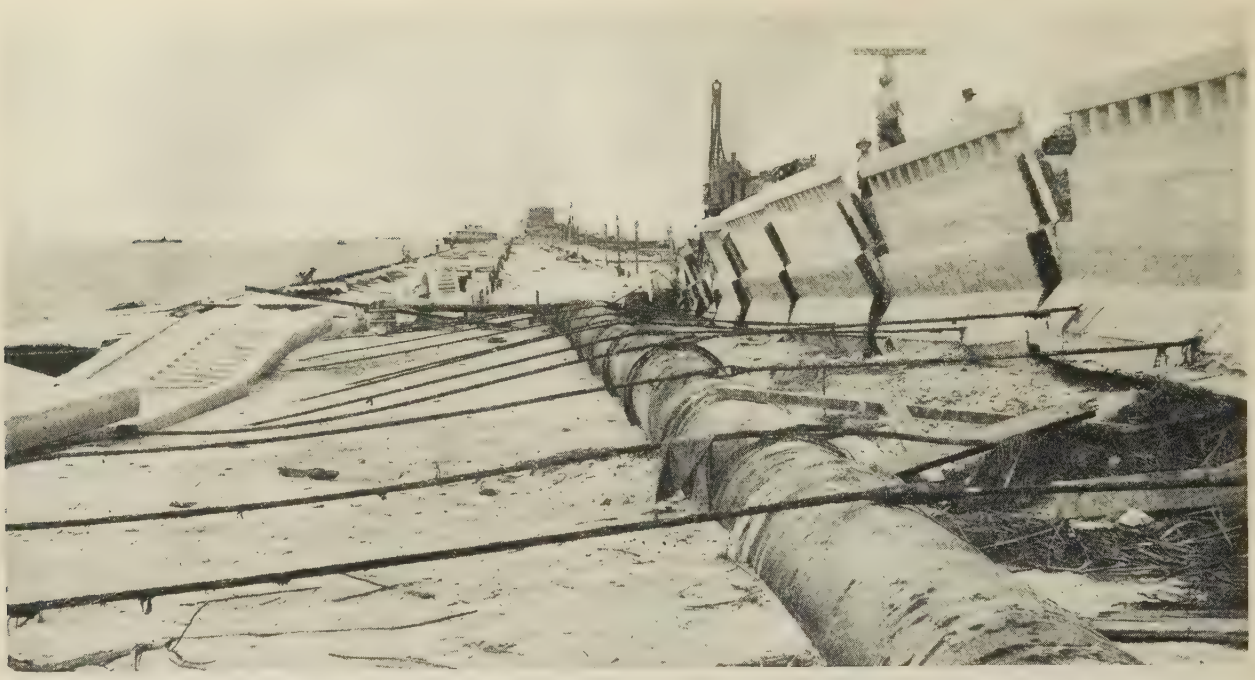
TRUE tidal waves are moderate and gradual upliftings of the waters of the earth under the gravitational pull of the moon and the sun. They sweep continually over the surface of the ocean, cause the regular ebb and flow of the tides on seacoasts, and do nothing to get themselves into the newspapers. Though of practical importance to mankind, they are tame and uninteresting in comparison with the sudden upheavals of the sea and inundations of the shore, due to causes other than the lunar and solar pull, to which the name "tidal wave" is almost universally misapplied, even in scientific literature. The dual use of this term is unfortunate—but apparently nothing can be done about it.

In the present article we shall—with apologies to the purists—use the expression only in reference to the waves of the second kind, which have no connection with ordinary tides. These waves are sometimes encountered by ships upon the open sea as enormous solitary mountains of water. Sometimes they roll majestically landward, growing steeper as they reach shallow water, and finally toppling over as huge breakers far beyond the shore-line. At sea they occasionally do structural damage to ships and wash men overboard, while on shore they often result in stupendous disasters, drowning thousands of people and destroying millions of dollars' worth of property.

Tidal waves appeal to the imagination of mankind because, in many cases, they arrive in calm weather and their cause is not obvious to casual observation; but there is no real mystery about them. Some are produced by storms, near or distant; some by earthquakes; others by volcanic outbreaks under the sea. Their habits are now so well known that it is frequently possible to predict the time and place of their occurrence on low-lying coasts long enough in advance to enable the inhabitants of the threatened region to escape or take measures of protection. When a tropical cyclone travels over the waters adjacent to the West Indies and our southern mainland, the Weather Bureau bulletins announcing its progress are well recognized by coast-dwellers to be flood warnings as well as storm warnings; for it has repeatedly happened that the tidal waves attending such storms have been far more destructive than the winds, even when veritable hurricanes blew.

WHAT THE WATERS HAVE WROUGHT IN THEIR FURY

The effect of high seas on a railroad embankment during the Pensacola, Florida, hurricane of September, 1906. Damage here was comparatively slight, in view of other tragedies of "tidal" waves



THE GALVESTON CAUSEWAY AFTER THE WAVES RECEDED

This was the work of the 1915 hurricane, when the sea wall saved the Texas city from a repetition of the great disaster of 1900

The prediction of a tidal wave due to an earthquake, though not common, is made possible in some cases by the fact that the vibrations from a distant quake registered by seismographs travel much faster through the earth than water waves travel over the ocean. At the Hawaiian Volcano Observatory on the morning of February 3, 1923, the instruments in the basement told of an earthquake two thousand miles away. Dr. Jaggar, the director of the observatory, realized that a tidal wave from the center of disturbance would roll across the Pacific to the Hawaiian shores, and he immediately sent out warnings by telephone. In the early afternoon the wave came. It washed sampans over the railroad bridge at Hilo, wrecked the bridge, and killed one man, but its consequences were slight compared to what they would have been if the community had not been warned.

Tidal waves are rare along the northeastern coast of North America, but one of considerable severity occurred in this region on November 18, 1929, as the result of a submarine earthquake centered in the Atlantic not far south of Newfoundland. The quake itself was of extraordinary violence and was registered by seismographs as far away as Victoria, B. C., Tucson, Arizona, and West Bromwich, England. The earthquake center was located by means of telegraphic reports from these places and others almost as soon as the destructive sea waves reached the shore. From New York City northward the waves caused heavy surf and minor floods, but the effects were much more serious on the south coast of Newfoundland where, in certain inlets, the narrowing channels increased the height of the advancing waters, which carried away houses, wrecked vessels and drowned more than a score of people.

As it is true of all tidal waves of earthquake origin, the disturbance of the ocean in this case was not due to a mere shaking of the bottom, but to its subsidence over a large area. Striking evidence of subsidence was furnished by the fact that eleven submarine cables south of New-

SCRAMBLED HOUSES

They were washed from their foundations and tossed in a heap by the waves of a tropical storm

COURTESY CARNEGIE INSTITUTION

AFTER A TIDAL WAVE ON THE COAST OF CHILE

Three waves, with an extreme height of twenty-three feet, rolled into the harbor of Coquimbo an hour after the quake of November 10, 1922

foundland were broken in at least twenty-three places. These breaks were evidently due to great landslides along the steep slopes of a submarine canyon extending southeast from Cabot Strait.

When a portion of the sea bottom thus sinks suddenly in connection with an earthquake shock, the water rushes in from all sides to fill the gap. This causes a temporary retreat of the ocean from neighboring shores, which, in countries subject to severe earthquakes, is a well-known premonitory sign of a tidal wave. Over the place of subsidence the inflowing waters are forced upward by impact, forming a mound of water. Presently this sinks under gravity and a wave spreads out from it in an ever-widening circle. The mound gives place to a depression, the waters flow back, and the whole process may be repeated several times before equilibrium is restored.

Thus the so-called tidal wave is really a series of waves, though only one or a few of these may be of extraordinary height. After the Concepción earthquake of 1835 three big waves swept over the town. In the Japanese quake of 1854 there were seven or eight great waves. The famous Lisbon earthquake of 1755 was followed by eighteen big waves at Cadiz.

The center of the Lisbon earthquake, just mentioned, was under the Atlantic. The shocks threw down almost the entire city of Lisbon, but a large proportion of the loss of life (variously estimated at from 20,000 to 100,000) was due to sea waves. When the quake began the water retired from the land to such an extent that the bar at the mouth of the Tagus was left completely bare, but it returned a few minutes later in a series of waves, the first of which was sixty feet in height. The disturbance of the sea attending this earthquake extended far and wide over the ocean. It caused destructive waves all along the coast of the Iberian Peninsula, and even as far away as Kinsale, Ireland, vessels were whirled about in the harbor and the market-place was heavily flooded.

U. S. NAVY

BEACHED CRUISER

The U. S. S. Memphis stranded on Santo Domingo sands by waves occurring in windless weather

FROM GUYOT'S "PHYSICAL GEOGRAPHY", 1873

THE EARTHQUAKE AND TIDAL WAVE AT LISBON

The sea wave that rolled in on November 1, 1755, was the most destructive ever reported in connection with an earthquake

The great earthquake that destroyed the city of Lima, Peru, on October 28, 1746, was accompanied by a huge tidal wave at the neighboring seaport of Callao, where the water first receded and then returned as a wave eighty feet high. Nineteen ships were sunk in the harbor, and four, including a thirty-four-gun frigate, were carried far inland.

On the morning of August 13, 1868, the *U.S.S. Wateree* lay anchored in the then Peruvian but now Chilean port of Arica. A few minutes after an earthquake shock a great tidal wave swept the vessel a quarter of a mile inland, where she was left high and dry. The waves from this disturbance traveled all the way across the Pacific to New Zealand, where they retained enough violence to destroy a bridge. On May 9, 1877, another tidal wave following an earthquake moved the stranded *Wateree* a distance of two miles. In this case, again, the wave caused damage in New Zealand fourteen to eighteen hours after it was experienced on the South American coast.

On June 15, 1896, a world-shaking earthquake occurred in the Tuscarora Deep, the trough-like abyss in the bed of the ocean just east of Japan. After the usual withdrawal of the water the Japanese coast was inundated over a length of three hundred miles and thirty-two thousand people perished. The disturbance was not felt by fishing craft a few miles out at sea, and the fishermen had no suspicion of the disaster until they returned to shore in the evening to find their villages completely destroyed.

The eruptions and uprisings of volcanoes under the sea sometimes cause tidal waves, but, on the other hand, the most gigantic outbreaks from craters above sea level and close to the ocean usually leave the latter undisturbed. The eruption of Krakatoa, in the Strait of Sunda, in 1883, was accompanied by a very destructive tidal wave; but in this case the explosion of the volcano left a huge chasm below the sea, into which the waters rushed. This was probably the chief cause of the wave, which swept over shores on both sides of the strait, drowning more than thirty-six thousand people. At one place hillsides were washed by the rising waters to a height of one hundred and fifteen feet above the normal level of the ocean.

The tidal waves that frequently flood low shores during the passage of severe storms are due chiefly to the force of the winds, but partly to the elevation of the ocean surface at the storm center under the diminished pressure of the atmosphere, and partly, in the case of the relatively small cyclones of the tropics, to the heaping up of the water by the convergence of the winds toward the center. As the winds may blow at high speed around the center while the storm as a whole travels slowly or even remains almost stationary for a time, the waves produced by these winds frequently travel far beyond the storm area. Thus it happens that a rising sea is a usual early sign of an approaching tropical hurricane.

In some cases the waves break in full force upon a coast when there is nothing else to indicate the proximity of a storm. This happened at Santo Domingo city on August 29, 1916, when the *U.S.S. Memphis* was driven ashore by a tidal wave. The vessel was preparing to put out to sea on account of an increasing swell, but the air was perfectly calm when the giant waves rolled in, hurling the ship so far up on the beach that most of the crew were easily rescued by means of life-lines. The principal loss of life resulted from the swamping of the ship's motor launch. Much mystery was made of this

disaster, on account of the absence of wind at the time and place of its occurrence. Sunday newspapers published lurid illustrated articles explaining how the tidal wave was caused by a great "submarine volcano," but the more prosaic truth appears from the weather map of the day in question. A cyclone was passing at the time not far to the southward of the open roadstead in which the *Memphis* lay.

Some of the worst tidal wave disasters due to storms have occurred along the shore of the Bay of Bengal. Thus on October 7, 1737, a cyclone passing over the bay raised the water in the River Hugli forty feet. The adjoining delta lands were submerged and some three hundred thousand lives were lost, making this the deadliest storm disaster in the history of the world. Among the islands of the Pacific and along the coast of China there have been several disasters of this character that, in their destruction of human life, completely eclipsed the worst tidal waves that have ever afflicted the United States or the West Indies.

• • •

THE TINY SEA CLOWNS

CAPRELLAS, ELVES OF THE DEEP

BY ELINOR SHANE SMITH

ILLUSTRATION BY ROSE CAMBELL

CAPRELLAS seem too fanciful and ghostlike to be real, but rather to be tiny comic cartoons of some sea student's origination—weird caricatures of some excessively emaciated, bowing, over-polite fairy creature! How erect they are with their slim, several-jointed bodies, yet, how often they wear an air of meek apology!

They are sometimes found in very low-tide pools, clinging to seaweeds and to hydroid colonies with their hind legs. These legs are somewhat curled under them and are very irregular in length; they suggest bent knees when the little creatures stand erect. They have six of these prehensile appendages, so the weird tiny beasties, seldom more than an inch and a half high, can stand up and bow at any angle, or loop along like a measuring worm.

DANCERS OF THE DEEP

The graceful, clown-like Caprellas as they appear in their watery home

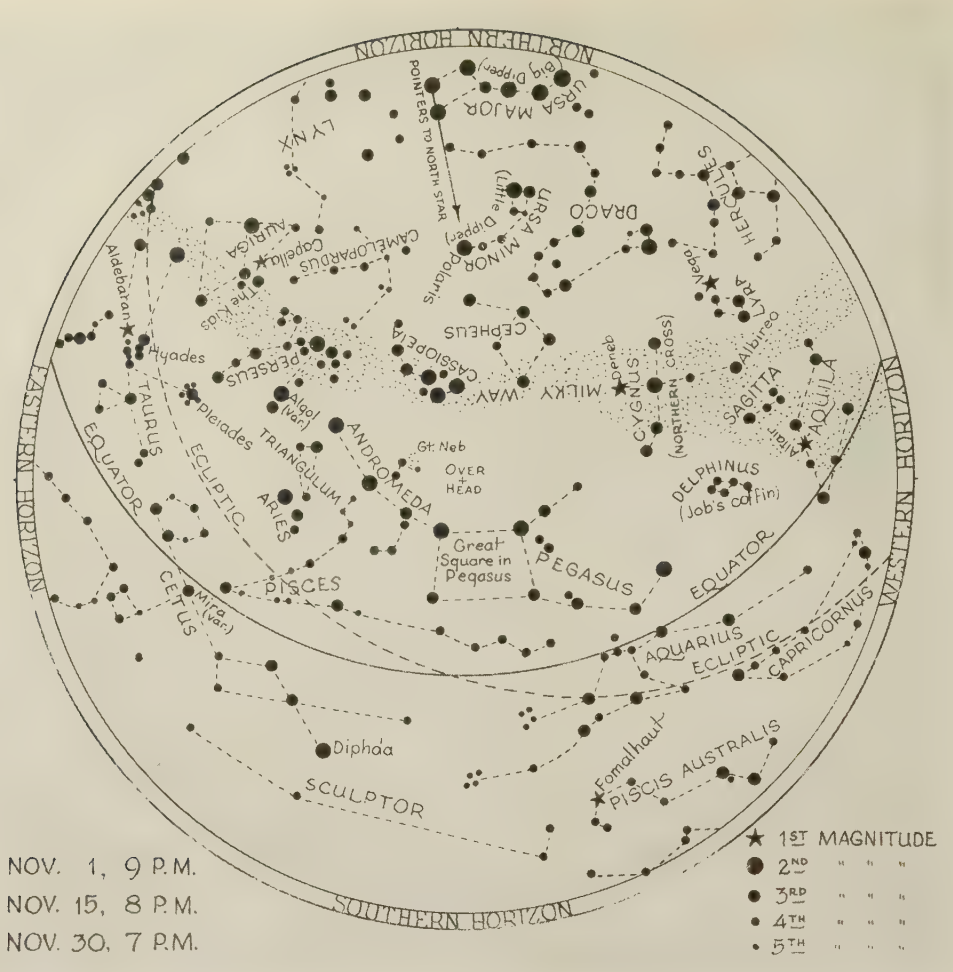
P. H. Gosse says of them: "They are as much at home in the tree-like zoöphyte [a slender, branching form of tiny sea life] as a family of monkeys in their aerial bowers, and indeed their agility, as they run from branch to branch, catching hold of a twig just within their reach and pulling themselves in an instant up to it, then stretching out their long arms in every direction, strongly reminds one of the spider monkeys of South America."

The tiny head and forward-bent long, slim neck of the Caprella runs into a wee rigid shoulder and upper arm. Each has two little jointed parts bearing what appears to be a small lackadaisically drooping hand—which is really a claw—on a largish upheld forearm. These are really food-grasping arms, which reach out and clutch tiny morsels while their owner bows and smirks amiably.

On its head with its quick eyes, it bears two pairs of long, slim antennae, one pair of which is shorter than the other and plume-like. There is also a very small clawed food-handling arm on each side. The gills are a pair of tiny oval appendages outside, on the front of the body. A female Caprella has in addition a bunchy brood pouch, and is much smaller than her mate.

She carries her tiny babies for some time after they are hatched in this brood-pouch, and they swarm in and out of it at will. Sometimes they are found holding on to their mother's back with their prehensile hind legs in all sorts of funny poses. Usually they are quite erect and wave their antennae gaily about.

The little comical creatures are yellowish-brown or sometimes reddish, and are so slender and small that they are seldom noticed; which is a pity, as few things in the sea or elsewhere present so tiny and funny an aspect.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

THE STORY OF THE LEONIDS

BY ISABEL M. LEWIS

If on the fifteenth of November at four-thirty in the morning should you discover an abnormal number of people standing about with their eyes turned toward the eastern sky, don't be alarmed. It will not be members of a religious sect awaiting the end of the world, nor will it be enthusiasts awaiting the arrival of another trans-Atlantic flyer. These people will be watching for the Leonids. What, you ask, are the Leonids?

In a word they combine to offer one of the greatest of celestial spectacles—a shower of meteors. Annually, in August, the Perseids provide a meteoric display, interesting but not spectacular. The Leonids appear only at approximate intervals of thirty-three years and because they are densely bunched in one part of their orbit they provide a heavenly shower of historic importance.

The pages of history, in fact, record that brilliant showers of Leonids have awakened people from their sleep. Records found in Chinese and Arabic, as well as English annals, show that these meteoric showers fell in the years 931, 934, 1002, 1101, 1202, 1366, 1533, 1602, 1698, 1799, and 1833. To this list may be added the great displays of the years 1866 to 1868. Those in 1833 were the most spectacular ever recorded, filling many of the ignorant and superstitious with terror. For two or three hours in the early watches of the morning the meteors fell, silently as snowflakes and almost as thickly. A Boston observer counted 650 in fifteen minutes, and reported some as being more brilliant than Jupiter or Venus and others as mere points of light.

This Leonid shower radiates from the direction of The Sickle in Leo and meets the earth "head on". In color the meteors are white or bluish-white. Their velocity relative to the earth is more than forty miles a second, and they leave vivid and persistent trails. It has been

found that they are travelling in the orbit of Tempel's Comet of 1866. Their condensation in a swarm is so pronounced and so extensive, however, that when the earth encounters the Leonids it is fully three or four years before the swarm has passed its point of intersection with the earth's orbit. The result is that for about three years, at thirty-three year intervals, there are extraordinary displays taking place about November 14 to 15.

After the great showers of the years 1833 and 1866-68 keen interest was aroused in meteoric astronomy and the return of the Leonids in 1899-1900 was widely anticipated. This interest was further stimulated by the fact that in 1898 a display of Leonids of more than ordinary strength was observed. These meteors were evidently the vanguard of the expected spectacular 33-year display. The general public, accustomed to the infallible accuracy of predictions of eclipses and periodic comets, was to suffer a keen disappointment, and its faith in the infallibility of astronomical predictions was to receive a staggering blow. The stage was set, the audience waiting, but the performance did not materialize. There was no exceptional display of Leonids in 1899 or 1900, simply the usual yearly display of stragglers. The main condensation, it was evident later, had been switched off its course by the perturbations produced by the planets Jupiter and Saturn near which the swarm had passed since its last appearance in 1866-68. The greatest display furnished by the swarm came in 1901 when Leonids were seen in large numbers. The shower was far inferior to the display of 1866-68, however. Evidently something had happened seriously to perturb the course of the swarm.

It is a long and troublesome process to determine the effect of the disturbances, or perturbations, produced upon the orbit of meteors by the planets but this was undertaken in the case of the Leonids by two English astronomers before the 1899 return was due. They found that the swarm was to pass so close to Jupiter in 1898, and had been so close to Saturn in 1870 that these two planets would seriously affect its path. The greatest change would be to throw the stream further within the earth's orbit and to change its distance from the earth, at the time when the great condensation was due to pass it. This change was more than a million miles distant so that the earth would pass through the outskirts of the swarm, or possibly would miss it entirely. These results were announced on November 10, 1899, a few days before the expected appearance of the great display of that year and, as predicted at that late date, the swarm had been diverted from its course by that troublesome giant, Jupiter.

As the year 1933 draws near, in view of the fact that the great condensation of Leonids is usually three years or more in passing the earth, the question arises as to what may be expected this year and next. There was an unusually large display of Leonids in 1898, members of the stream that had passed before Jupiter's attraction for the swarm had changed its course. Will there be a similar display now, 33 years later? Or in the years that have passed since that last display have the planets again been at work and further changed the position of the orbit? At least the Leonids should be watched with exceptional interest this month. Their greatest display for this year is due on November 14-15 in the hours following midnight or preceding sunrise.

The historical records of this interesting swarm indicate that though it may have been perturbed at times by the planets its course has not been permanently changed up to this time, though there have been years in the 33-year period when the displays were inconspicuous and unrecorded. Whether or not the great 33-year display is to be seen again in the near future is an interesting question and the number of Leonids that appear this month may give a clue to the answer. Those who wish to watch for the appearance of Leonids this year will have to be up between the hours of midnight and dawn and should face the eastern sky. At 4:30 A.M., November 15, the radiant of the swarm which is the direction from which the meteors appear to come, will be high in the east in Leo. At sunrise it will be nearly overhead. Counts of the number of meteors seen in a definite interval of time are of value and interest to astronomers.

The planet Venus has now returned to the evening sky. On the fifteenth it will be close to the southwestern horizon. From now on through the fall and winter it will be a brilliant evening star. Its elevation above the western horizon at sunset will continuously increase until it will set nearly four hours after the sun in the spring. Mercury will be an evening star this month but not well placed for observation.

Mars is still in the western sky and will be in Ophiuchus most of the month but too close to the sun to be seen to advantage. It sets about one hour after the sun on the fifteenth. On the eighteenth it will be in conjunction with Venus. The two planets will then be so close together as to appear almost like a double star. They will then be very low in the southwest at sunset, and it will be difficult to find them. They would form an interesting pair in the field of an opera glass.

Jupiter is now in Leo and rises about midnight. It is very near the radiant of the Leonids. Saturn is still in Sagittarius and sets about four hours after the sun on November 15.

The Great Square in Pegasus is now conspicuous directly west of the meridian. Alpha Andromedae is the second magnitude star in the northeast corner. Cassiopeia is now on the meridian above the pole and the Big Dipper rests nearly on the northern horizon. The Pleiades and Hyades in Taurus are coming well into view in the east and Orion is raising his huge bulk above the eastern horizon. All the brilliant stars of winter will soon be with us and observers will enjoy gazing heavenwards.

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THINGS TO THINK ABOUT

A PAGE DEVOTED TO CONSERVATION FROM VARYING ANGLES

• • •

Lessened Protection for Waterfowl

In our October issue we printed the new seasons for hunting waterfowl, shortened to one month because of the severe reduction in their numbers from various causes, mainly overshooting. Passing along the observations of the Federal authorities couched in the usual optimistic terms, we ventured to express the conviction that this measure would safeguard the supply of ducks and geese, if the sportsmen would cooperate. We also printed the President's special proclamation, bespeaking the cooperation of all interested organizations and public-spirited citizens.

Swiftly succeeding events show that our confidence in the sportsmen was misplaced. Scarcely had the ink dried behind the President's pen when machinery was set in motion to nullify as far as possible the real purpose of the regulations—to afford nation-wide protection to the waterfowl. The more fair-minded sportsmen everywhere, it is true, applauded the move, but a large and powerful element, in many of the states, were dissatisfied with the season allotted them, and vociferously called attention to the apparently greater advantage enjoyed by neighboring communities. So swift and effective were the protests that within a few days changes in the seasons in fourteen states were announced by the Secretary of Agriculture. The states affected are: Massachusetts, Connecticut, Rhode Island, Ohio, Indiana, Illinois, Missouri, Iowa, Nebraska, Kansas, Oklahoma, Nevada, Oregon, and Washington.

What the exact changes are matters little. The disheartening part is the revelation that among the more influential of the hunters in these states there were so many who failed to appreciate the opportunity to show their sportsmanship. In the hour of stress for the game birds that are dangerously reduced by overshooting, those responsible for the slaughter are thinking, not of the need of the birds, but rather of the gratification of their own desire to kill. They seemed to have forgotten that the Migratory Bird Treaty and the law were formulated to aid the birds to live, and not to help a savage horde of gunners to exterminate them. They revealed the pitiful poverty of their sportsmanship. To those reasonably familiar with the thinly-veiled attempts that many sections of the country, during the past decade or so, have made to get killing privileges that equalled or exceeded those of their neighbors, the present seems to excel all previous exhibitions of greed.

By no means may one grasp the whole story of this heartless assault on our wild life by reading merely the official announcements of the changes in hunting seasons. Knowledge of the weapons used in attempts to nullify the efforts of the true friends of the birds, however, may be gleaned from the public prints, for those who are willing to jeopardize the future of a great national resource for their present personal gratification have made free use of the newspapers. Mass meetings have been held to foment discord and to gain support for this or that idea. Petitions reciting the hardships of those who face reduced employment as guides, boatmen, and caretakers of hunting clubs; the need in certain communities for hunting of waterfowl for food; the desirability of safeguarding the huge investments in stocks of ammunition and shooting equipment, the danger of alienating the sportsman's respect for restrictive laws, even farm relief by using surplus grain for baiting the waterfowl, and so on. Even the nationally known conservation organizations, with few exceptions, have failed to give whole-hearted assistance to the authorities, but have sought rather to create the impression that some scheme of their own would have better solved the problem.

How shall one appraise the sportsmanship of those who use such weapons to oppose long-delayed relief sorely needed by helpless birds, and with the same breath vociferously proclaim themselves as sportsmen? The answer is all too plain, and will not soon be forgotten.

Report of Committee on Audubon Society

Some months ago NATURE MAGAZINE announced the selection of a committee to investigate certain charges against the National Association of Audubon Societies. The committee, appointed upon motion by Senator Frederic C. Walcott at the annual meeting of the Audubon Society on October 28, 1930, consisted of Chauncey J. Hamlin, President of the Buffalo Museum of Science; Dr. Alexander G. Ruthven, President of the University of Michigan; and Dr. Thomas Barbour, Director of the Museum of Comparative Zoology, Cambridge, Mass. Dr. Ruthven, for good and sufficient reasons, declined to serve and part of his letter of declination is now quoted. The remaining members have lately made their report and this, a pamphlet of 12 pages, is published and distributed by the Audubon Society under date of August 19, 1931. Its title is: "Report of the Special Committee appointed to investigate charges made against the National Association of Audubon Societies."

The charges discussed had been published in two pamphlets issued by the Emergency Conservation Committee—"A Crisis in Conservation" and "Compromised Conservation" issued respectively in June, 1929, and October, 1930. The first is disposed of by reprinting the statement of the American Museum disavowing official connection with the pamphlet, two of the authors having been employees of the Museum, and expressing the opinion that the "Crisis" is largely non-existent. The first point made is evident from the pamphlet itself; the second is at least debatable. We cannot spare time or space to consider in detail the charges contained in "Compromised Conservation". One concerns the taking of "Gun-makers' money", a considerable sum that was offered to and refused by the Audubon Society about twenty years ago. "At one meeting the sentiment was in favor of acceptance, at the next meeting the offer was refused". This is somewhat of an old story, and we are mainly curious regarding the names of the persons who voted for acceptance of the money.

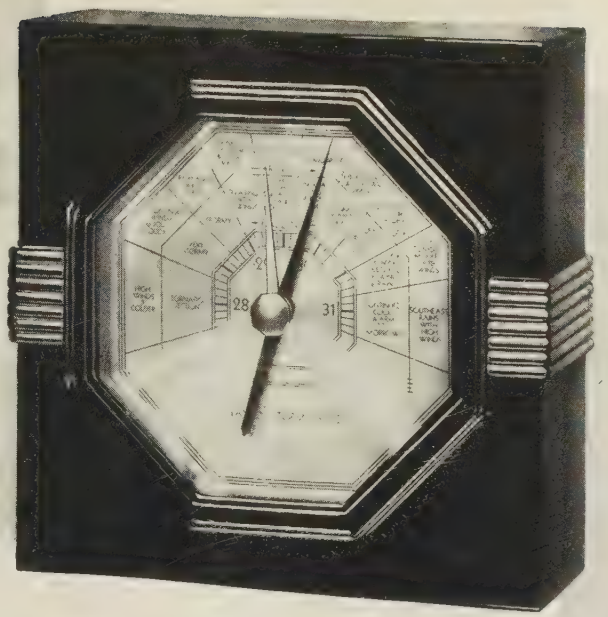
Six pages of the Committee's Report are devoted to a series of letters and resolutions showing that the Audubon Society, in 1923, disapproved of the establishment of a shooting club in Louisiana in the midst of several great reservations, including the Rockefeller Wild-life Reservation, the State Wild-life Reservation near Vermilion Bay, and the Marsh Island Reservation.

With the general conclusion of the Committee that the Audubon Society has accomplished great ends we fully concur, and we would express the hope that it will long continue all worthy activities. We must yield to the temptation, however, to refer briefly to certain items in the report that strike a discordant note. Occasion is taken to reflect on the "zoophile" who is "defined as one whose arguments are always based on sentiment and not on reason, who with entire honesty believes that if a forest is to be protected and preserved, no tree should ever be cut down, and who believes that no species of bird or animal can be adequately protected if any individual of the species is ever killed". We believe that there are few with such extreme views included in the vast army of Nature-lovers who are not satisfied with present-day conservation. But there *are* many thousands in the state and local Audubon Societies, and in other organizations, and many more thousands who are unorganized, who wish to see birds and animals protected, and who do not believe that the hunters are the only ones to be consulted. These have a right to look to the National Association of Audubon Societies, as the only large national organization primarily concerned with wild-life conservation, to represent them.

There *is* a crisis in the conservation of our birds, especially those classed as game, those "whose preservation is vitally dependent on the interest of intelligent sportsmen". All our grouse, quail, and turkeys, the doves, the woodcock, and several of our ducks and geese are facing serious conditions. Our native upland game birds, being in the custody of the States, are reduced during each shooting season to a pitiful remnant. Restrictions in the taking of migratory birds, which are under the care of the Federal Government, are fought by influential hunters and their organizations with every weapon at their command.

Let no bird lover be deceived by any report that declares that our game birds are not now facing a crisis. In this crisis, what the birds need most is fewer hunters and less shooting. And let us point out that the Society, and other conservation organizations as well, might with profit to their cause adopt the practice of introspection that Doctor Ruthven suggests may result in improvement.

"We'd better meet today, Jim. My Stormoguide says it will rain tomorrow."



"All right, Tom. You ought to know."

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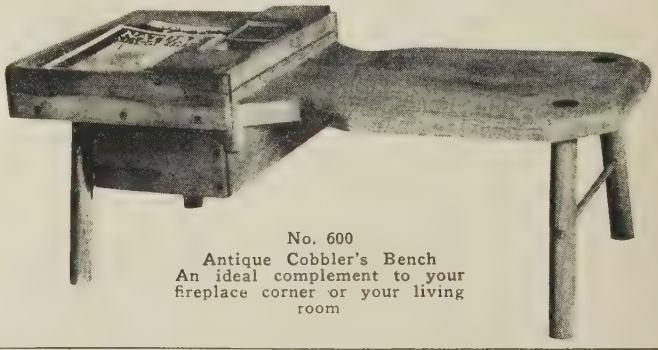

No. 600
Antique Cobbler's Bench
An ideal complement to your fireplace corner or your living room

BY ROCKET TO THE PLANETS

(Continued from page 278)

to 40 degrees below (this range often being covered between noon and midnight of one day) only a life form of the greatest hardihood could exist. It must be able to live on a curtailed ration of air, such as is found upon the tops of our own mountains, and be able to adjust itself quickly to the extremes of daily temperatures. If a life form such as man once existed on Mars, he would have either burrowed himself into the planet or fought a desperate race on the surface between the evolution of his being and death, as Mars lost its air and water. It is possible that a race resembling man might once have ruled the planet but failed in the race with evolution and gave way to less intelligent but more adaptable species. And if man wished to explore the red planet he must encase himself in a space suit (a modified diving suit) and carry with him containers of oxygen for breathing, to supply the deficiencies of the rare Martian air.

The meaning of the "Martian canals" discovered by Schiaparelli and Lowell and so ardently disputed by astronomers, will also be settled when an expedition lands on the red planet. We will know whether they are irrigation projects of a gigantic size executed by an intelligent race to keep alive, by herculean efforts, upon a dying world; or whether they are telescopic illusions or meaningless markings across the planet. Lowell died with the belief that Mars, being an older world than the earth, had once supported a race of intelligent beings who built the vast Martian canals. A settlement of this question should be itself sufficient reason for the journey.

The speculations that might arise on this subject are endless and it is possible that the final answer may escape our most shrewd guesses. But man of the twentieth century does not have within his grasp a means to the answer. He stands upon the threshold of adventures far greater and more thrilling than has ever been offered to the race. When the fulfillment will come, no one knows. But the instrument—the rocket—is ours, and with it the conquest of space should be possible.

HE SHOOTS THE SUN

(Continued from page 299)

been providing him with another absorbing study. November usually provides him with rich displays of that phenomenon. On November 27, 1885, as a child in Scotland, he witnessed an uncommonly abundant meteoric shower, so much so in fact that his mother told him and her other children to pray, for the end of the world was approaching. Utilizing his artistic talents, Mr. Henry made from memory a sketch of that occurrence. He thinks that a shower of equal intensity may happen in November of this year, 1932, or 1933.

In addition to building his astronomical instruments for himself, Mr. Henry about two years ago invented a celluloid plate device with graduated markings, which enables him to measure quickly in miles sunspots or groups of them on photographs taken by him. While professional astronomers are using methods of their own for the same purpose, the Henry device is overwhelming in its simplicity.

THE ALL-YEAR SUN ROOM

(Continued from page 310)

life is present. It seems to cry out for jardinières, hanging baskets and similarly delightful features. Plants and flowers should be everywhere in wall pockets, floor jars, and shelves before the windows that open upon it from the rooms. The wall pockets of shiny black or red or yellow tin, enamelled in decorative floral designs of many gay colors, are charming accessories. They support a green lattice panel upon which a brilliantly painted parrot is perched. These are correctly hung at either side of a door or window or elsewhere for architectural accent.

Few things add the note of cheer and life as do bird cages with their songsters, and goldfish bowls with their dashing, lively color. There are both hanging and standing cages in gay Japanese styles with joyous red tassels on their gold and black backgrounds. There are lacquer effects and simple wicker ones, as well as others. Hung high, they add interest to the lines of the porch, making for a certain grace and verve. Goldfish bowls also come in numerous forms, some supported on wrought-iron standards to rest upon the floor, others without the floor standard to rest upon a table.

A few panes of glass, a little heat, tastefully chosen draperies and furniture—and your summer porch, so popular during the warm months, becomes the most delightful room in the house, whatever the weather outside. And what wouldn't you give up before this extra winter room that so capably radiates cheerfulness and gayety on even the dullest days of the winter season?

PLANTING THE GARDEN, MONTH BY MONTH

By Romaine B. Ware

A real garden fan does not measure his enthusiasm by the calendar. March and April are naturally bubbling over with gardening urge, the heat of midsummer weeds out many a faint heart but the real test comes when Jack Frost marshals his cohorts and banishes all growth for the year. If your interest still waxes strong, if you are so busy planning next year's garden that you waste no regrets over the passing of this year's flowers, then you have a right to consider yourself a real gardener.

Except in the extreme north where the final freeze-up comes early, November is a busy month. In fact the enthusiastic gardener feels he must hurry at this time. The days are shorter and every sign points to the early end of outdoor activity. Many tasks may still be accomplished, not the least of which is planting roses and tulips. It is the perennial regret of countless thousands of gardeners when spring finds their borders lacking the gay splashes of tulips. Nothing can take their place and if you do not plant this fall you will have to wait a whole year because this is the only time they can be put into the ground.

Buy tulips by the hundred at least; the price per thousand is even better. If a thousand is more than your budget will allow, pool the orders of your neighborhood and take advantage of quantity prices. Buy either named varieties or a good mixture. A half-dozen good ones, reasonable in price are Clara Butt, Farncombe Sanders, Inglescombe Yellow, Pride of Haarlem, The Sultan and Rev. H. Eubank. A few costing slightly more would be La Tulipe Noire, Wm. Pitt, Louis XIV, Cardinal Manning, Baronne de la Tonnaye, Bouton D'Or and Prince of Orange. Always plant in clumps or groups of six to twenty-five bulbs.

If you contemplate planting roses this fall by all means secure a copy of "How to Grow Roses" by Pyle, McFarland and Stevens. This was published a year ago, sells for $2.00 and is worth many times the price to home gardeners. Many public libraries have it and more should have because it is by far the most practical book on roses to be had today. Roses can well be one of our most satisfactory flowers if we will just take the trouble to learn their needs and provide for them. The difficulty with most gardeners is that they just putter along with their roses without definitely knowing their needs and requirements. Roses are a bit more exacting than a lot of other flowers but their entrancing beauty makes them most worth while.

As deciduous shrubs and trees shed their leaves we come to appreciate evergreens all the more. Also, at this season we learn the value of shrubs with bright berries that cling throughout the winter. Now is a good

Plant Daffodil Bulbs

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Few, if any, of the Spring Flowering Bulbs have the exquisite variety of form that the Daffodil has. Large, bold trumpet varieties, delicate white petaled varieties, pale primrose varieties with deep orange cups.

Daffodils in their many forms are most desirable to grow in your garden for their effect, as well as for cutting to decorate the home. Plant in the garden, in the shade of your foundation plantings or shrubbery border

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To encourage wider use, we are offering a Mixture taken from named Giant and Medium Trumpet varieties grown at our "Mile-Front Daffodil Farm" on Long Island.

50 Bulbs $3.50, 100 Bulbs $7.00, 1,000 Bulbs $60.00

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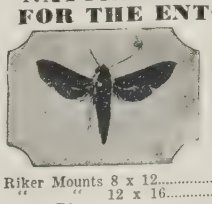

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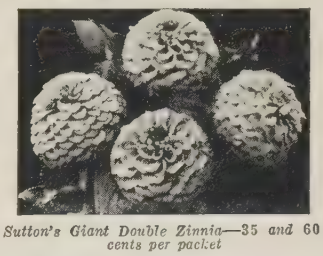

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Rose growers—expert and amateur—agree that autumn is an ideal time to plant Roses. In our great assortment you will find New Roses and Rare Roses difficult to obtain elsewhere; Roses that will give the greatest satisfaction to the master and mistress of the garden. In this group are named a few of the newer varieties.

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In addition to these newer varieties we have a large collection of Old-fashioned Roses that have not been available in Commerce for many years.

All our rose plants are field-grown, low-budded, well matured and ready to burst into abundant bloom in your garden when spring's warm days coax nature into growth.

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"Getting Personal with Mountain Lions"

THIS new lecture is the result of several expeditions made with Arthur Newton Pack, President of the American Nature Association, into little-known regions of Colorado, Utah, Arizona and New Mexico. Besides the remarkable pictures of the cougar, the pictures show a wide range of fascinating wild life in its native habitat—all taken during weeks of work by the Pack-Finley expeditions. The whole is a lecture one should not miss.

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time to make a survey of your plantings and see if they can not be improved by additions or replacements here and there. Maybe you have some common lilacs that bloom poorly and could well be replaced, or a common snowball bush which annually becomes infested with insect pests. Following the check-up of your plantings, spend several hours at the best nursery in your section and search out the particular variety of shrub or tree that will fit your needs. The nursery salesman will be only too glad to aid you in choosing well. Don't be afraid to dig out and replace any plants where improvements can be made. Just because a shrub or tree has been in your garden for some time is no good reason why it may not be replaced if something better is available. Most of the berried shrubs may be planted at once or early next spring. Evergreens are best moved late in the spring, but now you should plan for them and select your material.

A mulch of hay or straw over the perennial border will prove a welcome protection during the changeableness of winter. Do not apply it till the ground is frozen or it may become a nesting place for mice which prove so destructive to trees and shrubs by girdling them. No manure, except it be very thoroughly rotted, should be mixed with the mulch. Partly rotted manure may be spread around shrubs and trees but to avoid bark injury must never touch their trunks. The main purpose of a mulch is to prevent damage by alternate freezing and thawing.

Be sure the variety name is permanently marked upon the plants in your borders, as much of their interest is lost when we lose their identity. Stakes firmly driven into the ground or some of the many kinds of metal labels on the market today may be used for this purpose. Avoid stakes that will appear conspicuous as they detract so much from the looks of a border. Be sure your bulbs and plants in storage are carefully marked also.

After the hardy chrysanthemums are through flowering, cut them back to within a few inches of the ground. This not only prevents damage by the whipping of winter winds but growth next spring will be all the stronger. Fall is the time to plan where your borders need additional clumps of these valuable fall perennials.

Delphiniums, hollyhocks and phlox which frequently suffer from attacks of rust or blight should have their tops and stems cut to the ground and, together with all their leaves, promptly burned. Peonies, too, should be cut to the ground at this time. To avoid damage by slugs scatter coarse coal ashes over and around the crowns of your delphinium plants. These little things and many others will do much to eliminate possible trouble next season.

Winter protection of roses must not be neglected. Just before the ground freezes, hoe the soil up around each bush to a height of eight or ten inches and after the freeze-up fill in between the plants with hay, straw, cornstalks or some such coarse litter. In extremely cold sections a covering of hay or straw should be applied over the entire bed and this protected from getting wet by boards or tar-paper. Do not apply till the ground is frozen.

With some varieties of lily bulbs we get most of our stocks from foreign sources and many of them do not arrive till quite late

n the fall. If you plan to add any of these o your garden you must prepare the ground before the freeze-up and mulch heavily that planting may be possible when the bulbs arrive. Lilies are among our most beautiful flowers but, due largely to the fact that they have been little understood, many failures have resulted. Within the last few years much valuable information about lilies has been published and today there is no excuse for your not learning how to handle them. They are really not as difficult as their reputation indicates.

Sweet peas sown now will bloom about two weeks ahead of most spring-sown varieties. Prepare your soil in the usual way and plant seeds sufficiently late that they will simply germinate this fall but make little growth. Then the rows should be covered several inches deep with straw or hay. In the spring when growing weather arrives, uncover gradually and growth will begin again. By this method and using the early flowering varieties, you will get away ahead on the season.

Fall sowing of annuals is an excellent practice, especially with poppies, cornflowers and larkspur which bloom much earlier by this method. Almost any annual which self-sows can be seeded in the fall.

If you have never had hot-beds or cold-frames to start seedlings in, you will find them almost invaluable. Farmers Bulletin No. 1171, "Growing Annual Flowering Plants," may be had from the Superintendent of Documents, Washington, D. C., priced 15 cents. This bulletin will tell you all about how to build and operate them. They should be constructed in the fall as their usefulness begins before soil can be worked in the spring.

Do not make the mistake of mulching your lawn with stable manure. Not only is it wasteful and unsightly but, by scattering weed seeds, is positively detrimental to the lawn. Well-rotted manure has had the weed seed killed by fermentation and in a pulverized condition makes a good lawn mulch. A one-inch layer of good garden loam and well-rotted manure, with about a third by bulk of sharp sand, applied each spring and fall, will do wonders in keeping your lawn healthy.

If the season has been dry in your section be sure your entire garden is thoroughly watered just before the final freeze-up. A large percentage of winter killing is due to freezing dry. Your plants should not go into winter in a pool of water but the soil should be moist to the depth of a foot or eighteen inches at least. With newly planted material and all trees and shrubs this is especially important. Be sure to stake all newly planted shrubs and trees so that winter winds will not whip them loose. Much of the success of next year's garden depends upon the care you give it now. The good gardener does not neglect his plant children just because their blooming season is over.

For the Driveway

Of special interest to the home-owner who has a driveway to repair or a new one to lay is the new curb-gutter block recently devised and manufactured by a New York firm. This gutter block combines both curb and gutter, thus assuring a permanent edge to the drive, and is frostproof. Readers interested can obtain information by addressing the Hints and Helps Department of NATURE MAGAZINE.

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When winter comes . . . give yourself this glorious change of scenery and climate in 23 pleasure-packed days aboard the luxurious *California*, sailing on February 27 next.

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Another Nature Magazine cruise is scheduled for January 23... 18 days aboard the *California*.

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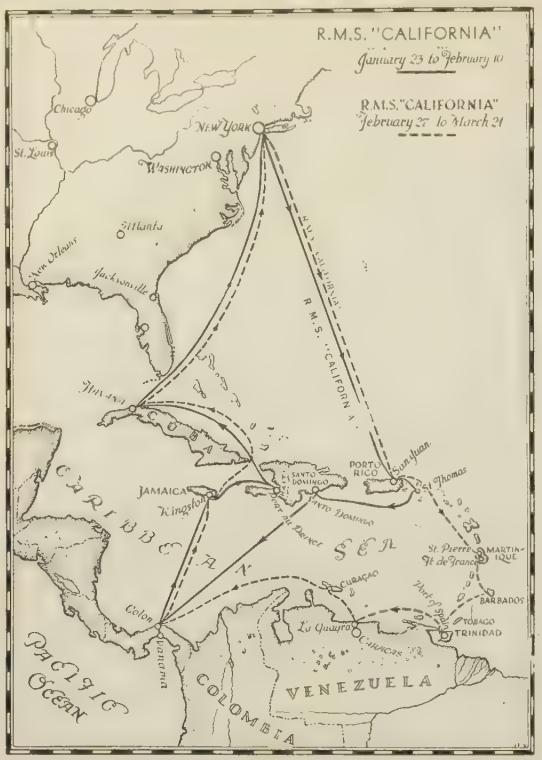

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The twenty-three day cruise leaving New York February 27 is indicated by the dotted line on the map.

The eighteen-day cruise leaving January 23 is only tentatively scheduled and depends upon interest shown.

• • •

A Winter Trip That Is Different

"What I wanted was a winter vacation with a congenial group," said one of the members of last winter's Nature Magazine Caribbean Cruise. "And I certainly found it."

Others have the same opportunity this year. . . A twenty-three day cruise on the luxurious R. M. S. CALIFORNIA, calling at the most fascinating Caribbean ports . . . Specially-arranged shore trips exclusive to our group . . . Party strictly limited to twenty-five . . . Conducted by a member of our staff intimately versed in the Tropics . . . Excellent medium-priced accommodations forward on C-Deck held for our party . . . Every detail on ship and ashore cared for, even to deck chairs and dining room seating . . . A winter holiday that is an assured success before you start.

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Palm Beach Suits in March?...Why Not?

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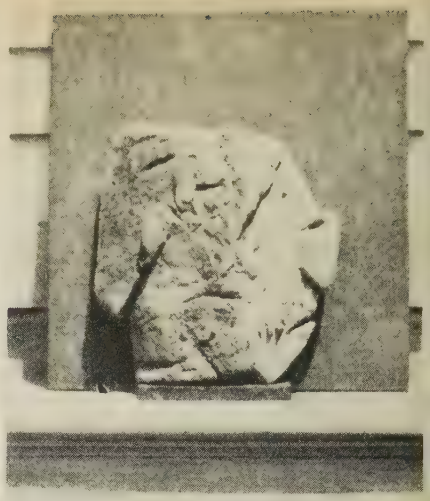

Whose Picture Is This?

Nature as a sculptor never could be accused of deserting stark realism for romantic imaginings if the two faces on the stone in the photograph above are fair samples of her work. The first is slightly cubist in manner, we believe, while the second, which may be seen by turning the page 90° to the left, has an inexplicable cleft in the forehead. The rock was found by the grandfather of Charles H. Fletcher of Newburgh, New York, on Mt. Beacon, near where the Beacon Air Light now stands, in 1907. It is fourteen and a half inches high, twelve and a half inches wide and three inches thick. Just whom was Nature depicting?

Manzanita Cider

Indian Maggie is probably the most popular of her race in Yosemite Valley this year—and the answer is manzanita cider. Maggie demonstrates the customs of her ancestors in a tepee behind the Yosemite Museum, and has captured the entire tourist trade by passing out a delicious drink. She crushes a quantity of the red manzanita berries, removes the seeds and pours a pitcher of cold water through them twelve times—no less than twelve—and a clear, yellow punch, tart and yet sufficiently sweet, is ready for consumption. Visitors say it is as good as lemonade, and is one of Maggie's finest achievements.

Well-mannered Bear

A Yellowstone bruin that insists on sitting down to meals as humans do has been entertaining visitors at the Towers Falls Camp this summer, according to Gertrude Renneckar of Smithville, Ohio. When the bear sees a family about to open the lunch kit, he walks up to the camp table, throws one leg and then the other over the camp bench, and lays his paws on the table in a human-like manner as if to say, "Thanks —what have you got?" Then he looks at the campers with such pleading in his eyes as to be irresistible. After being fed, he is always willing to pose for a few pictures and then ambles off until another meal time.

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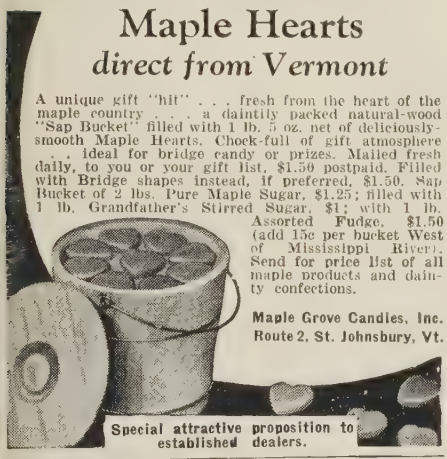

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BIGHORNS

(Continued from page 282)

In habits these northern sheep are very similar, living mainly on the steep mountain ranges or coming down to low country to feed on willows, grass and lichens which they quickly leave for the steepest slopes when alarmed or attacked by enemies. In winter they paw away the snow to get at the green and dry vegetation beneath and keep much on the bare, wind-swept ridges in spite of the bitter cold.

They are probably more numerous than any of our southern mountain sheep and should always be kept so, for they occupy a country of little value for other wild life, in a zone generally above the range of the caribou and moose. Thanks to the long, patient studies of the late Charles Sheldon, their habits, both in summer and winter, are better known than those of most of our more southern sheep, and the great McKinley National Park is now affording a refuge to large numbers of them.

Of all game animals, mountain sheep are among the most defenseless against the carnivores of the lower country which hem them round and force them to their rocky heights for protection. Wolves, coyotes, mountain lions, Canada lynxes and bobcats miss no opportunities to feast on them, as shown by sheep hair in the droppings of these animals along the trails just below their range. None dares follow them over their rocky cliffs, but some are always watching if they come too low or drift into tempting meadows on the mountain slopes.

The National Parks of both the United States and Canada are now giving wise protection to mountain sheep and many of the states where they occur try to prohibit any hunting of them and to maintain them as far as possible on their original ranges. The day will surely come when they will also be brought into full domestication on much of our rough and northern country, where such an animal is greatly needed.

A significant habit of mountain sheep is their love of caves for shelter and protection, although these often turn into traps for their destruction. Even today they regularly inhabit large caves in the mountains of New Mexico, where they go during stormy weather and rest on soft, dry beds of dusty earth; but many old skulls and bones show that they have been cornered and killed here by man and beast. In the lava bed caverns in New Mexico, California, Oregon, and Idaho their skulls are found back in dry, well-sheltered spots where years ago they had been killed. They often take refuge to sleep during the day, with little danger and much comfort, in open, shallow caves along the base of the cliffs of canyons and mountain walls. Still more often they scrape off the loose stones from some ledge or narrow shelf of rock and lie on the smooth surface where they can see far below and well around on at least two sides. They have little to fear from above, except from eagles when the lambs are small.

Few large game animals have a wider range of food plants than mountain sheep. While to some extent grass-eaters, they are great browsers and in both summer and winter subsist largely upon the buds, leaves, bark and twigs of dwarf mountain willows, mountain alders, dryas, and a great variety of shrubby and herbaceous

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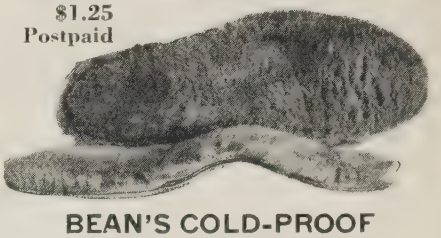

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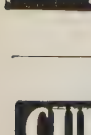

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plants, ferns, mosses and lichens. In summer, twigs, leaves, buds, flowers, fruit and seeds are eaten and in winter whole plants are often chewed to the ground and the roots dug up and eaten after the snow is pawed away and the plants exposed. On their rocky peaks and cliffs and ledges there is usually no competition with other browsing animals and food seems generally abundant and of good quality. Their niche in the upper world is generally all their own.

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John Muir, in the fall of 1873 on the headwaters of the San Joaquin River in the High Sierra, came upon a band of some fifteen bighorns in the canyon and watched them cross the foaming river by leaping from boulder to boulder where a misstep would have cost their lives, then bound up ledge by ledge and crack by crack with amazing skill until they reached the top of the two thousand foot canyon wall. Not a slip or stumble or accident marked the climb, and at the top, still visible against the sky, they paused to look down at him in groups of twos and threes before passing out of sight.

A long and careful study of specimens will be necessary for determining the relationship and definite ranges of all the species and sub-species of mountain sheep in America and if possible it should include all the sheep of the world. At present we can do little more than give type localities and provisional ranges for those that have been described. Most of the subspecies are based on valid but not strongly marked characters and a thorough revision of the group will probably not make many changes.

The type localities are as follows:

Names and Type Localities of North American Sheep

Ovis canadensis canadensis Shaw, 1804. Bow River, Alberta, near the present town of Exshaw.

Ovis canadensis californiana Douglas, 1829. Columbia River, Oregon, near the mouth of the Des Chutes River.

Ovis canadensis auduboni Merriam, 1901. "Upper Missouri," probably Badlands between the White and Cheyenne Rivers, South Dakota.

Ovis canadensis samilkameenensis Millais, 1915. Similkameen Mountains, southwestern British Columbia.

Ovis canadensis nelsoni Merriam, 1897. Grapevine Mountains on Nevada and California line, just north of Death Valley.

Ovis canadensis sierrae Grinnell, 1912. East slope of Mt. Baxter, Sierra Nevada, California.

Ovis canadensis mexicana Merriam, 1901. Lake Santa Maria, Chihuahua, Mexico.

Ovis canadensis sheldoni Merriam, 1916. El Rosario, northern Sonora, Mexico.

Ovis canadensis cremnobates Elliot, 1903. Matomi, San Pedro Martir Mountains, Lower California, Mexico.

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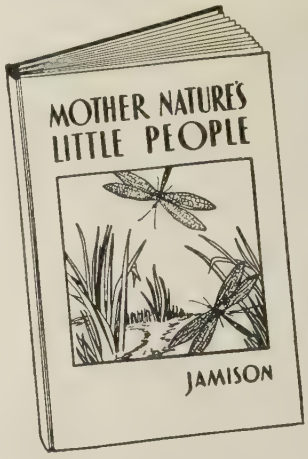

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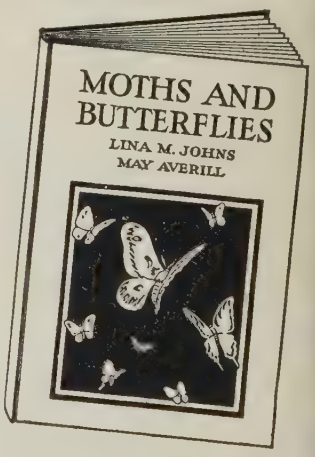

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Ovis canadensis texiana Bailey, 1912. Guadalupe Mountains, near New Mexico line, Texas.

Ovis dalli dalli Nelson, 1884. Mountains west of Fort Reliance, Alaska, on divide between Tanana and Yukon Rivers.

Ovis dalli fannini Hornaday, 1901. Dawson City, Yukon, Canada.

Ovis dalli kenaiensis Allen, 1902. Head of Sheep Creek, Kenai Peninsula, Alaska.

Ovis dalli stonei Allen, 1897. Headwaters of Stikine River, northwestern British Columbia, Canada.

Ovis dalli cowani Rothschild, 1907. Mountains near Mount Logan, northwestern British Columbia, Canada.

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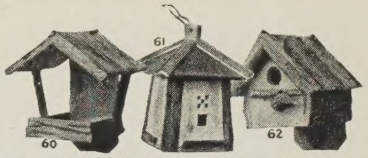

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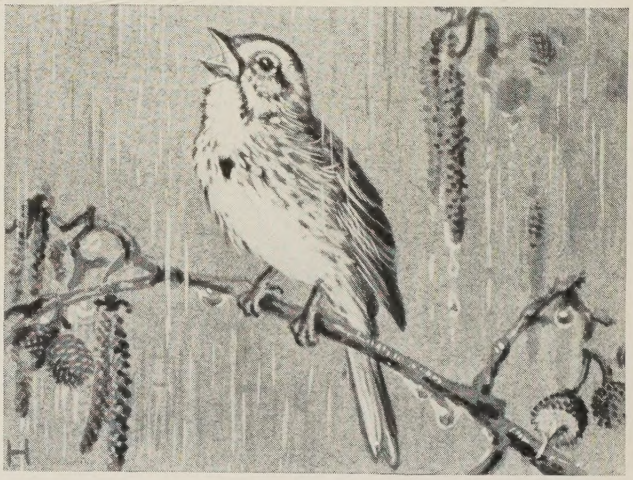

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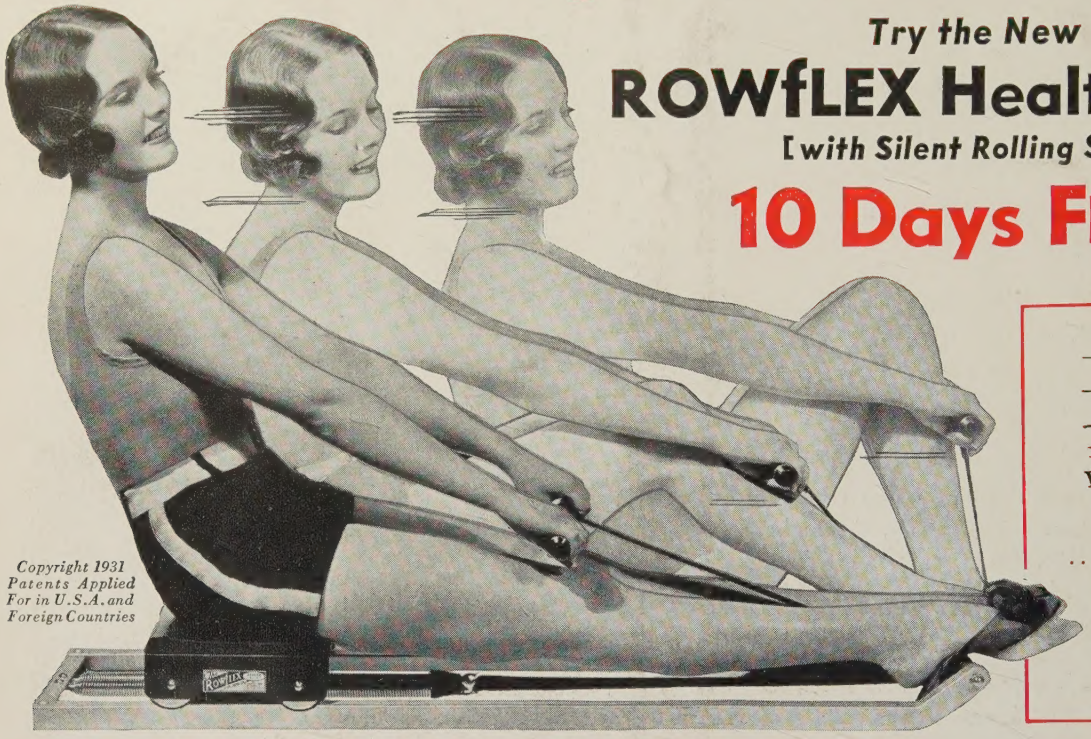

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